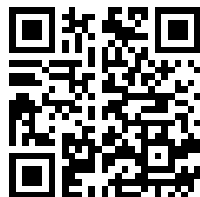

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STRATEGOS

THE AMERICAN GAME OF WAR



TEXT AND APPENDICES

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STRATEGOS:

A SERIES OF
AMERICAN GAMES OF WAR
BASED UPON MILITARY PRINCIPLES

AND DESIGNED FOR THE
ASSISTANCE BOTH OF BEGINNERS AND ADVANCED STUDENTS
IN PROSECUTING THE WHOLE STUDY OF
*TACTICS, GRAND TACTICS, STRATEGY, MILITARY HISTORY, AND
THE VARIOUS OPERATIONS OF WAR.*

ILLUSTRATED WITH NUMEROUS DIAGRAMS.

TO WHICH IS APPENDED A COLLECTION OF STUDIES UPON
MILITARY STATISTICS
AS APPLIED TO WAR ON FIELD OR MAP.

BY
CHARLES A. L. TOTTEN,
FIRST LIEUTENANT, FOURTH UNITED STATES ARTILLERY.

IN TWO VOLUMES.
VOLUME I.—TEXT AND APPENDICES.

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WAR DEPARTMENT, WASHINGTON CITY, }
April 24, 1880. }

The issue of a certain number of copies of the Book of Rules and Tables of Strategos, the American Game of War, for use in the Regular Army, is hereby approved.

A careful consideration of the STATISTICAL merits alone of this work will recommend the new line of investigation proposed therein as worthy of the diligent study of all concerned.

(Signed)

ALEX. RAMSEY,
Secretary of War.

"The earnest student is, then, in this dilemma, that he requires a knowledge of *theory* to understand the facts, and a knowledge of *facts* to understand the theory. The only mode of extrication would appear to be to read military history until he can form theories for himself. But what a task is this for one to enter on who does not yet know what it is he wants to know! When the works of single military authors extend over a dozen volumes, where shall he begin to enter on the trackless expanse before him? And it must be remembered that the reading is a small part of the labor compared with the exertion of thought necessary to perceive and generalize the significant facts."—Hamley's "Operations of War."

"Various sciences serve as a basis for the employment of troops in war, but the leading of them is a special art in itself. Though the formation of the character of the individual must be left to practice, yet the formation of military judgment can be perfectly well attained theoretically. There are many ways of effecting this; after many years of practical proof the following method appears to me the most judicious: To produce a variety of situations by a continual exercise in specified cases; to teach the art of war in them, and thus to form the above-mentioned qualities through an abundance of actual solutions and dispositions which the pupil has to make." . . .

"For private study this manner is also applicable, as a situation can either be created or a given one taken, and the student exercise himself in projecting orders and directions, representing the special dispositions for the march, the length of columns, and the time of their departure. Next he supposes reports or orders to arrive, or the appearance of hostile divisions, and designs what steps are to be taken. Such circumstances can enter into play as fix the attention on the rules of leading during and after action; but these studies are only initiatory, and must never be conclusive. War brings forth new pictures, and, though the situations appear very similar, they are hardly ever entirely so. The problems which a leader can set himself, or which he is set, are endless; the means which stand at his disposal in the way of strength, composition, and quality, the purposes which an enemy pursues, the ground in all its aspects, and a great number of other elements form a wonderful kaleidoscope, which accident throws together into the strangest figures."—"Studies in Troop-Leading," by Colonel I. von Verdy du Vernois.

"The Emperor Napoleon was himself the real head of his staff. Provided with a compass open to a scale of from seven to eight leagues (which always supposes from nine to ten leagues, at least, from the sinuosities of the roads), leaning and sometimes lying on his map, where the positions of his army corps and those presumed of the enemy were marked off by pins of different colors, he ordered his movements with an assurance of which it would be difficult to form a just idea. Moving his compass quickly over his map, he judged, in the twinkling of an eye, the number of marches necessary for each of his corps to arrive at the point where he wished to have it on a named day; then, placing his pins on these new sites, and combining the quickness of the march which it was necessary to assign to each of his columns with the possible epoch of their departure, he dictated his instructions, which alone would be a title to glory."—Baron Jomini.

"Before entering on an undertaking, I have meditated for a long time, and have foreseen what might happen. *It is not genius which reveals to me suddenly, secretly, what I have to say or to do in a circumstance unexpected by other people; it is reflection, it is meditation.*"—Napoleon I to Senator Roederer.

TO
AMERICAN SOLDIERS,
FROM AN INTEREST IN WHOSE IMPROVEMENT
THE FOLLOWING PAGES HAVE DERIVED
ALL THAT IS VALUABLE
AS TO
ORIGINALITY AND ARRANGEMENT,
THE
GAME OF WAR,
STRATEGOS,
IS MOST RESPECTFULLY
DEDICATED.

P R E F A C E.

BARON JOMINI defined Strategy as "the art of making war upon the map," and in the same train of thought the name of "Strategos" has been given to the following series of games, or practical studies, for elucidating the various problems of war upon both Map and Field.*

"Strategos" is intended to afford assistance to both beginners and advanced students in prosecuting the study of the Art, Science, and History of Warfare.

Its "Rules and Tables" possess a value which is entirely independent of their mere use in the Game-room. Considered thus independently, they suggest a method of studying the true bearing of *military statistics* upon the operations of war, and their theatre is coextensive with the Field and Map. If such a study be legitimately pursued, it can not fail to prove of immense importance to advanced military students, and to exert a direct influence upon the correct solution of the great tactical and strategical problems of the present day.

The "Outfit" accompanying the Game will afford to all classes of military students an unlimited means of "object study." Tactics, Grand Tactics, Strategy, and the various Field Operations in time of war may

* The word Strategos comes directly from the Greek word *στρατηγός*, a general, which, in turn, is derived from *στρατός*, an army, and *αγω*, to lead. Strategos was originally used as the title for a high military official, that of the Commander-in-Chief, the "Army Leader." In its secondary meaning, this term was employed to designate a council of ten officers, elected annually at Athens, to command the army and navy, and to conduct the War Department. It was, in fact, a Home Board, or executive Council of War. From this same class of Greek roots come some of the most expressive modern terms in the Science of War, such as Strategy, Stratography, Strategics, Stratonic, Stratagem, etc.

be practically elucidated thereby, while the numerous text-books and advanced works upon these topics may derive therefrom the most copious and entertaining illustration.

Games, more or less military in their features, are far from being the outgrowth of the last few years of progress in teaching the Art and Science of War. Soldiers have always regarded the ancient game of chess * as essentially a Battle Game, in which the *relative values and powers of the various "arms"* formed the important study. So, too, the game of draughts or checkers, several hundred years older than chess, is one governed by the great underlying military principle of *decisive concentration at an opportune moment*. In fact, the special idea embodied in a Game of War † has been in existence since the dawn of history, and even in its modern signification is by no means of recent origin. Indeed, it will probably surprise many to learn that Kriegsspiel itself has been played in Prussia for over half a century. Its invention is generally ascribed to Herr Domänenrathe von Reisswitz, a citizen of Prussia, in about the year 1820, he having first conceived the idea of transferring the study of military principles from the checker-board to the map. ‡ His son, a

* In its earliest form, chess was played by four persons, and the moves were governed by the toss of a die. It was undoubtedly the War Game of its day, and perhaps a very truthful representation of the relations it undertook to illustrate.

† In the reign of Louis XV two distinct games—"Le Jeu de la Guerre" and "Le Jeu de la Fortification"—appeared, and were played in French military circles. These two games, however, do not seem to have borne any resemblance to the German Kriegsspiel. They were played with cards, upon which certain military symbols were depicted, and it is said that some copies of these cards still exist in the English War Office.

‡ The history of the modern Game of War is a very difficult one to trace, and we shall not attempt it, further than to submit the following list of the more important publications, both previous and subsequent to that of Von Reisswitz, that have come to our notice:

1. "Essay of a Tactical Game based upon the Game of Chess." 2 vols. 1780-'82.
2. "The Kriegsspiel; an Essay to represent in a Social Game the Different Rules of the Science of War." By Dr. C. L. Hedwig. 17.. (?)
3. Venturini, "A New Kriegsspiel." Schleswig, 1798 and —.
4. Venturini, "A New Kriegsspiel for Use in Military Schools." Leipsic, 1804.
5. "The Rules for the Kriegsspiel." By Opitz. At Halle, 1807.
6. "The Rules for the Kriegsspiel." By Glöden. Hamburg, 1817.
7. "The Rules for the Kriegsspiel." By Perkuhn. Hamburg, 1818.
8. "The Kriegsspiel." By Major-General Baron Pidoll.
9. "The Kriegsspiel." By Captain Fischer v. See.
10. "Instructions for representing Military Manœuvres by the Apparatus of the Kriegsspiel." By Von Reisswitz. Berlin, 1824.

First Lieutenant in the Prussian Guard-Artillery, more or less perfected the details of the game, and in 1824 published it at Berlin under the title of "Instructions for representing Military Manœuvres by the Apparatus of the Kriegsspiel." This was followed in 1825 by a supplement, and by

11. Supplements to above. Berlin, 1825 and 1828.
12. "The Rules for the Kriegsspiel." By Von Planer. Vienna, 1835.
13. "Military Manœuvres, with the Assistance of the Kriegsspiel Apparatus." Second edition; five plates. 1855.
14. "Instructions for Kriegsspiel." By W. Tschischwitz. Neisse, 1862. Fourth edition, 1874.
15. "Military Manœuvres with the Assistance of the Kriegsspiel Apparatus." "Austrian Military Gazette." 1865.
16. "Directions for Fortification Kriegsspiel." By Major von Neumann. Berlin, 1872.
17. "The Kriegsspiel Apparatus, with the Rules pertaining thereto." By Captain Carl Zipser, of the Austrian army.
18. "Instructions in Formation of Battle Tableaux, with the Apparatus of the Kriegsspiel." By Von Th. v. Throtha. Berlin.
19. "Rules for the Conduct of the War Game" (English). Compiled and translated from Von Tschischwitz's "Kriegsspiel," by Captain E. Baring, R. A. London, 1872.
20. "Studies of the Kriegsspiel." By Captain Meckel. Berlin, 1873.
21. Third edition of Von Throtha. Berlin, 1874.
22. Fourth edition of Von Tschischwitz. Neisse, 1874.
23. "Studies of the Kriegsspiel." By Captain Edmund v. Mayer. Vienna, 1874.
24. "Fortification Kriegsspiel." By Lieutenant-Colonel Makowiczka. Vienna, 1875.
25. "Directions for the Kriegsspiel." By Captain Meckel, 1875-'76.
26. "The Kriegsspiel." By Colonel I. von Verdy du Vernois. Berlin, 1876.
27. "Collection of Problems for Tactical Exercises." By Skugarewski. 1876.
28. "The Kriegsspiel." By Captain Carl Zinner, Fourth Artillery. Josefstadt. 18—.
29. "Regimental Kriegsspiel." By First Lieutenant von Naumann. Berlin, 1877.

In addition to the above are many translations of the same, with more or less of alteration, into the French, Austrian, Italian, and Belgian. Moreover, in Berlin there has been published a regular journal devoted to the interests of this game, "The Berlin Kriegsspiel Journal." At Magdeburg, thirty odd years ago, a society was formed for the special object of playing the game, Von Moltke himself being its first president. The published proceedings of this society are understood to be very valuable. In our own country, several elementary Tactical Games have appeared from time to time, the earliest "set of blocks" of which we have any authentic information being that described in Robert Smirk's "Review of a Battalion of Infantry," published in New York in 1811, and copyrighted in America from the London edition (1803) of the same.

During the late war three several sets of Tactical Blocks appeared, the invention of Captain G. Douglass Brewerton, United States Army. They were called, respectively, "The Automaton Regiment," "Company," and "Battery," and became quite generally known throughout the country, until they fell into disuse by reason of a change from the tactics upon which they were based.

The most complete of this class of "dummy" Regiments is the automatic "Drilling Apparatus for Demonstrating Upton's U. S. Infantry Tactics," by Colonel Brownell, of the Forty-seventh Regiment, N. Y. N. G., published in 1878.

From several veteran officers and soldiers we have also had brief mention of a game called "Royal Chess," that was once played to some extent in "the old army." Two to four sets of chess-men were employed upon each side, and several officers would take part in the play. This was, no doubt, a military game, based upon and perhaps identical with the earliest form of Kriegs-

another in 1828, both by the same author. It is on this account that the name of Von Reisswitz has become so particularly identified with the game, and with its introduction and growth into importance in European armies. The game thus brought before the public was flatteringly noticed in the "Militär-Wochenblatt" as early as March 6, 1824, and since that time, though more especially during the last twenty years, numerous codes of rules for conducting it have appeared on the Continent. These various systems, however, are all based more or less upon the same original, and differ only in minor details. So, likewise, the game lately (1872) published by the English War Office, and sometimes known as "Aldershot," is merely a free translation, with some improvement and tactical alteration of one of these Prussian codes. This translation of Von Tschischwitz's code of rules marks the introduction of Kriegsspiel, properly so called, to English-speaking armies, and, if we overlook the translations of Colonel Vernois's "Studies in Troop Leading," is, thus far, perhaps, the only attempt to interest English soldiers in this highly scientific form of military study.*

It is but just, then, to claim here for "Strategos," that it is the first independent study that has appeared in the English language of the same problems that have been so long investigated in the various foreign codes of Kriegsspiel. Nor should its broader claim, that of having systematized the whole subject covered by these games, be overlooked. Not only does "Strategos" attempt each elementary problem that has heretofore formed a separate study, but it combines them all, for the first time in the history of the War Game, into such a gradual series as to afford a progressive teacher in every branch of practical military study.

spiel. If so, it was probably studied from the original, as no translation or English book of rules to this game has been met with.

In 1866 C. B. Richardson & Co. published an elementary game called "War Chess, or the Game of Battle," some copies of which are yet extant in American army circles, and in 1876 J. B. Lipincott & Co. published another, called "Militaire," the invention of Rev. Dr. Wilhelm, of Pittsburgh, Pennsylvania.

* It is understood that the first set of the more modern Kriegsspiel was introduced into this country by Captain William R. Livermore, of the Engineers, some six or eight years ago, and soon after its translation into English by Captain Baring, R. E. This game was played at Willett's Point for several years, and was from thence introduced at West Point, from which latter post, however, it has found its way to but few others.

"Strategos" is the result of several years of private study, unassisted by reference to any foreign code until it had become a finished system. This avoidance of foreign methods was not, of course, an intentional one, but was due to what now can not but be regarded as having been a fortunate inability to procure copies of such rules. It was, in fact, this inability that originally induced the author of "Strategos" to attempt the problem independently. Since, however, its completion, and during the considerable delay that has unavoidably surrounded its publication, a great many copies of foreign codes have been fortunately procured, a study of, and comparison with, which has proved of inestimable value in its revision. The Game is thus privileged to bring many new and valuable features to the study of war on the map, which could hardly have resulted from a mere compilation from such foreign codes at the outset.

The need of some such game has long been felt in this country, and in offering "Strategos" to the military public, it is confidently believed that it will meet the wants of the American soldier, with special reference to whose necessities its several independent studies of gradually increasing importance and complexity have been arranged, far better than the mere translation of even the very best of the foreign games could ever do.*

Five of the several applications to which this outfit may be put do not come within the scope of any of the Continental War Games of the present day, and are thus purely American features.† These applications, which will be more carefully noticed in their proper places, are—

* See Appendix L.

† Abroad, such elementary applications are now regarded as of minor importance, and certainly are completely overlooked in the desire to present an advanced and necessarily very complicated game to those few special students whose interest and professional investigations might lead them to it. The great mass of military aspirants in our country will thus always fail to find interest in Kriegsspiel, because of its complexity at the very outset. This, too, in no small degree, accounts for the extreme slowness with which this game, though so long in existence abroad, becomes known in America, even among officers of the Regular Army, who alone, perhaps, as a class, can afford to be its constant players.

But "Strategos," having advanced thus progressively with the subaltern and the student, is not open to these objections, nor does it by any means neglect the special wants of the few whose extensive knowledge of the military art, science, and history, and whose more than passing object in studying these matters, would demand the highest and most scientific application of the outfit. Its Advanced Game affords to the professional military student every opportunity that could be desired for prosecuting studies, commenced in more elementary fields, to their legitimate termination.

1. The universal comprehension of all the details of *Minor Tactics*.
2. The capacity of the outfit for the study of *Grand Tactics*, *Strategy*, and *Military Topography*.
3. The special facility afforded by the outfit for the study of *Historical Battles and Campaigns*.
4. The valuable assistance it affords for illustrating *Text-books* upon military principles.
5. The simple *Battle Game*, based upon correct military principles, and calculated to instruct as well as interest, without fatiguing, that large class of students whose patience would not stand the attempt to study the more complicated Advanced Game.
6. And, finally, the *Advanced Studies*, embodying all that is valuable in the foreign codes, and introducing many new and noticeable improvements in the matter of method, men, tables, and adaptability to American requirements.

From such as may feel disposed to criticise these studies, the author will gladly receive such suggestions as will tend to their further improvement.*

Assistance in collecting additional statistics, data, and military notes of every description relative to the prosecution of war upon the field and map, and which will enhance the *practical* value of the present collection of Tables, or enlarge its scope, is also earnestly solicited, and will be gratefully acknowledged. It is certain that vast quantities of such valuable material now exist uncollected in the possession of individual military students, and it is very desirable that this material should be gotten together, and published for the benefit of all concerned.

For their continued encouragement and courtesy, and for much valuable assistance in prosecuting the many details of the present undertaking, the author desires to express his great indebtedness to the following, among many other, officers of the Regular Army: Major Generals Winfield S. Hancock, John M. Schofield, and Irvin McDowell; Brigadier

* It will be noticed, however, in studying the *Battle Game*, that any alteration, even of a single rule, will affect more or less its whole current; and it is but just to say that the present code of rules for this branch of the subject is the result of a score of different sets actually tried and carefully studied over a long period.

General Richard C. Drum, Adjutant General, U. S. A.; Colonels J. C. Kelton and Samuel Breck of the Adjutant General's Department; Lieutenant Colonels Samuel B. Holabird, Alexander J. Perry, and Henry C. Hodges, of the Quartermaster's Department; Brigadier General Joseph K. Barnes, Surgeon General; Colonel Charles H. Crane, Assistant Surgeon General; Major Joseph J. Woodward, Surgeon, and Captain V. B. Hubbard, Assistant Surgeon, of the Medical Department; Brigadier General Horatio G. Wright, Chief of Engineers; Captain Henry M. Adams and Lieutenant Carl F. Palfrey of the Engineer Department; Brigadier General Stephen V. Benet, Chief of Ordnance; Brigadier General Albert J. Myer, Chief Signal Officer; Lieutenants Charles E. Kilbourne, Second Artillery; H. H. C. Dunwoody and Robert Craig, Fourth Artillery, on duty in Signal Department; Colonel Peter S. Michie, Professor Natural Philosophy, U. S. Military Academy; Chaplain James O. Raynor, U. S. A.; Colonel William H. French, Captains Joseph B. Campbell and Frank G. Smith, Fourth Artillery; Captain Joseph P. Sanger, First Artillery; Captain Lewis Smith, Third Artillery; First Lieutenants William R. Quinan and Alexander B. Dyer, Fourth Artillery; First Lieutenant Clarence A. Postley, Third Artillery; Second Lieutenants William Crozier, Howard A. Springett, and John R. Totten, Fourth Artillery; Second Lieutenant James E. Runcie, First Artillery; and Cadets George W. Goethals, Henry A. Schroeder, and Walter K. Dickinson, U. S. Military Academy. The author is also indebted to Past Assistant Paymaster John N. Speel, of the U. S. Navy, and to Brigadier General McComb, Lieutenant Colonel David Wilder, and many other officers of the California N. G.; to Brigadier Generals Edward L. Molineux and George W. Wingate, late Superintendent of Rifle Practice, and numerous other officers of the N. Y. N. G. To W. C. Church, Esq., Editor of the "Army and Navy Journal," he is indebted for continued interest in the undertaking, and he desires to thank a vast number of gentlemen of the National Guards of the various States for repeated letters, expressing interest in the work and offering many valuable suggestions, that, having been most willingly adopted, deserve acknowledgment. He would also return thanks to Ed. S. Young, Esq., and other officials of the Baltimore and Ohio Railroad,

and to the officials of the Pennsylvania Central Railroad, for most valuable assistance in collecting the important Military Railroad Statistics contained in Appendix F. We have also to acknowledge the courtesy of George L. Spofford, Esq., Librarian of Congress; Mr. Edward McPherson, Secretary of the Republican Congressional Committee; and L. R. Hammersley & Co., editors of the "United Service Magazine," for permission to make use of their valuable published statistical matter.

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July 1, 1880.

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- E. Showing the Various Distances, in Miles, that can be Marched over by "The Three Arms," Separately and Combined, in Campaigning.
- F. Showing the Distances over which the Various Arms can "Manœuvre" upon the Battle-Field.
- G. Time Required for Various Purposes.
- H. Miscellaneous Notes, etc.
- I. Of Possibility to Advance, Retreat, Maintain Position, etc.
- J. For Deciding Possibility by an Appeal to a Single Die.
- K. For Deciding Higher Ratios of Possibility, etc., than 5 : 1, by an Appeal to 2 or 3 Dice, as the Case may be.
- L. Giving Duration of Condition, Engagements, etc.
- M. Giving Casualties due to Fire of Springfield Rifles.
- N. Giving Casualties due to Fire of Gatling Guns.
- O. Giving Casualties due to Fire of 12-Pdrs.
- P. Giving Casualties due to Fire of 3"-Rifles.
- Q. Giving Casualties due to Fire of Hotchkiss Revolving Cannon.
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- T. For Deciding "Results" and "Consequences."
- U. Form of Keeping the Game Ratio.
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TABLES TO APPENDICES.

Appendix E.

- "a." Synoptical Statement of Deaths during the Rebellion.
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- "a." Table of Fire of Springfield Rifle, Cal. 45.
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- "c." Table of Fire of 12-Pdr. (Light).
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N. B. The Present Period may be termed that of the Magazine Gun.

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- "a." Military Strength (Personnel) of the United States.
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- "a." Ratios expressed by a 12-Faced Teetotum.

Appendix K.

- "a." Table of Losses (Das Regiments Kriegsspiel. Berlin, 1877. Von Naumann. A Translation).

Miscellaneous.

- Table showing the Various Distances in *Yards*, represented by Inches and Parts of Inches on Maps at a 10-inch Scale.
- Table showing the Map-Spaces, at Various Scales, which Correspond to Different Distances in Yards, etc.
- Table showing the Degrees Corresponding to Certain Slopes, and *vice versa*.

STRATEGOS.

THE OUTFIT.

EACH full set accompanying the game of Strategos contains the following *matériel*, the various parts of which will be found useful in studying one or the other of the several independent branches into which the course of games or studies is divided.*

I. *Military Pieces* (corps).—Two sets of *men*, slated (red and blue), each containing the following :

Infantry.....	{	80 Half regiments, representing.....	40,000 men.
		40 Divisions (2 cos.), representing.....	8,000 “
		200 Companies or Skirmishers, representing.	20,000 “
		48 Tool and spare ammunition-wagons.	
Cavalry.....	{	12 Battalions, representing	4,800 “
		48 Companies (squadrons).....	4,800 “
Artillery.....	{	16 Batteries, representing.....	2,480 “
		8 Half batteries, representing.....	620 “
		16 Caissons and spare ammunition pieces, bat-	
		tery.	
		8 Caissons and spare ammunition pieces, half	
		battery.	
		12 Extra battery pieces.	
		12 Extra half-battery pieces.	

* The publishers of the book are D. Appleton & Co., Nos. 1, 3, and 5 Bond Street, N. Y., and of the Game Apparatus, Messrs. Hartley & Graham, Nos. 17 and 19 Maiden Lane, N. Y.

Engineers..... 4 Companies, with tools, representing..... 600 men.

Miscellaneous.. { 48 Baggage pieces.
 { 24 Stands of colors.
 { 50 Circular pieces.

Total number in each army, 626 pieces..... 81,200 men.

Aggregate in both armies (red and blue), 1,252 pieces.....162,400 “

These pieces are made of wood or pasteboard, as the case may be, the former material being employed to represent line-pieces and the latter generally used for skirmish-pieces, etc. They are all provided with a *silicate-slate surface*, the use of which will indefinitely extend the capacity of the outfit. The skirmish, or pasteboard pieces, are of a lighter shade than the others, to facilitate study. The student himself must designate and employ these pieces to suit his necessities. For instance, in studying Minor Tactics, the various officers and non-commissioned officers may be designated either by name or proper insignia upon the round pieces. The same pieces may likewise be the several representatives of the *numbers* in a set of fours, a gun detachment, etc. In the Advanced Game they may be employed to designate generals, by name or insignia, corps by badges, etc., scouts, etc. For a general consideration of this subject the reader is referred to the body of the text, the appendices, plates, etc.

II. *Tactical and Topographical Blocks*.—These are of various sizes, as follows :

28 pieces.....	1" × 1"	4 pieces.....	3" × 1"
14 “	2" × 1"	24 “	4" × 1"
12 “	2" × 2"	12 “	4" × 2"
		2 “	6" × 8"

Total number in set, 96.

These blocks are made of thin pieces of wood, and are all slated upon one surface, one half in red and the other half in blue. The slated sides are regarded as their tactical ones. Upon the reverse side of each will be found topographically depicted, in the proper military symbol, rivers, mountains, swamps, lakes, woods, villages, etc. In studying tactics it is intended that the slated sides shall be turned up, and according to their size the several pieces are to be employed to represent sets of twos or fours, platoons, companies, etc. In order to facilitate the study of artillery tactics, certain special pieces will be found pertaining to its various schools. In the Ad-

vanced Game these large slated pieces will frequently be found convenient to designate distant corps, brigades, etc. When so employed, their strength, character, etc., should be written upon them, and, when they arrive within the scene of hostilities, they should be exchanged for the proper military pieces.

III. *Four Game-boards.**—These boards are slated white (for the lead pencil), and are ruled into inch squares for use in the Battle Game, or for convenience in drawing maps at various scales of inches per mile. Each board folds up along its middle line so as to be 20" \times 12" when closed, and 20" \times 24" when opened.

For special purposes, as, for instance, in the study of an *historical* battle or campaign, as many of these elementary boards may be employed as are necessary, they being placed together upon a large table in any order and to suit convenience. In playing the Battle Game, the slates should be so arranged as to form a large board 48" \times 40", though, in learning its moves preparatory to playing a regular (corps) game, or where only a division of the line is used on each side, one board will generally be sufficient.

In the Advanced Game the map used by the referee should, if possible, be drawn upon this large slated board, for the convenience it will afford him in taking notes and recording remarks, concerning the various pieces en-

* Extra Game-boards may be procured of the publishers of the Game Apparatus, Messrs. Hartley & Graham, 17 and 19 Maiden Lane, New York City, also slated *cloth*, for campaign study, 48" wide and of any desired length. Parts of the outfit lost or damaged may be replaced at moderate cost.

For convenience in playing the Battle and Campaign Games, a large table-top or drawing-board should be procured, its dimensions being about 5' \times 34', and its ends being provided with raised flanges about an inch high to prevent warping, and to keep the *men*, etc., from being swept off the table. Along the center line of this board a screen should be raised during the preparations for playing a Battle Game. This will be most conveniently effected by putting two augur holes, 54" apart, upon this line, so that each hole comes about three inches from the end of the table. Two rods (iron?) 18" high, and made to fit snugly into these holes may now be put in place, and a screen, supported if necessary upon a crosspiece, stretched between them.

In playing the Advanced Game a set of screens should entirely conceal the players and their tables from each other, and, when but two maps are employed, should be so arranged that the referee may command a view of both tables at once. When, however, the referee himself has a map, it will best be located in the middle, and properly screened from each of the others, which, if in the same apartment, will thus be screened from each other. Spectators will usually find most interest in studying the dispositions upon the referee's map. The most convenient screens for the advanced game, when but one map is employed, are two upright ones jointed so as to accommodate themselves to the sinuosities of the front of each player's site, as limited by the possibility of vision, etc. These screens may be stood upon the map so as to screen from view such parts of each player's territory as would be hidden from the opponent, the "middle ground" between them being free to both players. With the employment of such screens one map will answer all the requirements of the Detachment Game.

gaged, upon the field itself. It will also be found very convenient when used for taking transcripts of the various successive stages of a battle, as with the use of colored crayons every new line taken up may be temporarily marked for reference in the final discussion of the game. For further explanation, see body of the text (§ 33, etc.), and Plate III.

IV. *One printed copy of rules and diagrams.*

V. *Miscellaneous material:*

- 2 manœuvring calipers, or graduated dividers.
- 2 range scales.
- 2 grade scales.
- 2 pairs of tweezers or holders.
- 1 set of colored crayons.
- 1 set of colored marking pins.
- 2 lead pencils.
- 2 slate pencils.
- 2 erasers.
- 3 dice.
- 1 dice-box.
- 1 12-faced teetotum.
- 1 mounted time-board.
- 1 mounted order of procedure.
- 1 mounted multiplier-board.
- 1 set of selected tables for mounting.

THE MINOR TACTICAL GAME

FOR ILLUSTRATING THE TACTICS OF "THE THREE ARMS."

THE MINOR TACTICAL GAME.

1. The various *men* and pieces comprised in the Strategos outfit will afford valuable assistance in the practical study of the *Tactics* of any or all of "the three arms." Their proper employment for this purpose will readily suggest itself to the student, who, by their aid, may graphically represent any of the various tactical formations, such as squads, detachments, sets of fours, companies, squadrons, batteries, battalions, etc., as well as all of the usual tactical movements in any stage of completion, these latter being shown either in detail or generally. In other words, in prosecuting the study of *Tactics*, it is intended that the several pieces shall be employed merely as so many *men* or *dummies*, and placed in the several orders, formations, and ranks necessary to elucidate the subject under consideration at the time.

2. The several formations may be represented either *in detail* or in a more general manner. In the former case, the round slated pieces may be employed to represent individual soldiers ; in the latter, suitable larger pieces (from the tactical and topographical set) may stand for sets of fours, platoons, companies, etc., as the case may be.

3. For example : suppose it is desired to form a model Infantry company, properly officered and of full strength, and in such a manner that it shall be adapted for the study of the school of the company (see Upton's "Infantry Tactics," Plate I, § 176). Take 11 or 12 of the large-sized slated pieces, which are four squares long and two squares deep, and arrange

them in line, slated sides up ; or else take 22 or 24 of those which are four squares long and but one square deep, and arrange them in a similar manner, but in two ranks (see Fig. 1, Plate I). In either case they will represent so many sets of fours. Single round slated pieces may or may not be now placed upon their squares to represent the individual soldiers and corporals properly posted and numbered. We shall thus have a body of 88 or 96 men, in two ranks, counted off, and divided into platoons. Let now four single slated pieces (of the small round kind) be suitably designated (see appendix A) to represent the *Company Officers*, and, added in their proper places, also five to represent sergeants, and if two more are added for musicians, and one for a marker, we shall have a model infantry company of 100 men or more, ready to illustrate in each and every particular all the manœuvres and formations in the Company and Skirmish drills.

4. As a matter of convenience in studying the manœuvres in the school of the Company in *detail*, the *number* of sets of fours may be reduced to four or five (see Figs. 2 and 3, Plate I), and in platoon movements two pieces only (see Figs. 4 and 5, Plate I) need be employed. In a similar manner, ten or twelve of these large pieces may be used to represent so many *companies*, and, by adding smaller pieces as officers, file-closers, field and staff, music, etc., we shall obtain a miniature Battalion (Plate I, Upton's "Infantry Tactics," § 368) with which to prosecute the study of its school and ceremonies. The same pieces may still further be used to represent the Battalions of a Brigade, or, by adding Artillery pieces, the units of a Division of the line ; or, by adding both Artillery and Cavalry pieces in due proportions, the tactical manœuvres of an Army Corps may be fully investigated.

5. Suitable pieces will be found in the outfit which will accommodate themselves to any tactical formation or study ; as for instance, in the tactics of the Line or Column of Masses, § 637 and § 668, Infantry tactics, where the two-inch-square slated pieces may be advantageously employed. A similar employment of the pieces may be made for the elucidation of the Tactics of the other two *arms* ; in the case of Artillery, while certain special ones will be found to assist in the foot-drill at the pieces, a judicious employment of the various slated pieces will fully illustrate the tactics of the Battery and Battalion School. In fact, the outfit has been calculated and arranged expressly to represent every formation and movement in either Infantry, Artillery, or Cavalry Tactics, and this at any stage.

6. The advantages of such a complete set of *men* will certainly be seen by the private scholar of Tactics, and will be especially appreciated by all who are actually engaged in teaching its rudiments, either in "Company Schools," or as Professors at the various Military Academies and Colleges throughout our country.

7. Upon the *drill-ground*, instruction must always be one-sided; the drill-master alone sees a movement in all of its bearings, and is exercised in noticing that each of its minutiae is properly carried out. The subalterns, the non-commissioned officers, and those in the ranks of even our most skillful volunteer and cadet companies, come at length to go through the movements mechanically. The mere soldier, as such, has little to remember in drilling outside of the simplest elements, and it is very rare that even a well-drilled man can explain a tactical movement clearly and in all of its bearings. When, however, to drilling we add theoretical instruction, and supplement the study with the ready illustration afforded by suitable blocks and counters, Tactics becomes familiar to the student in a way that mere drill alone never could accomplish.

8. The writer has for several years been becoming more and more convinced of the *practical* value of the theoretical information imparted by the use of a *dummy company* or battalion. Having been for some time engaged in the military department of a national institution, where *recitations* in Tactics formed an important part in the curriculum, and having seen this and other systems in active operation, he is convinced that the one now advocated has only to be tried to have its merits fully established.

9. In the winter, when out-of-door exercises are often impracticable, drilling must either be given up or armory drill be resorted to. But the limited manœuvres possible even in a capacious armory soon become monotonous. It is at this time in particular that the value of a *model company*, battery, squadron, battalion, or army is thoroughly appreciated. By its means the very best and most entertaining kind of instruction can be afforded. The student or officer is now no longer responsible for his *own position* alone, but must comprehend a movement both as a *whole* and in *every detail*. He learns to view it as a *drill-master* must to be a successful one, and to follow it through all of its varying changes, distances, positions of officers, etc.

10. Tactics so taught will *always be understood*, and will be remembered far more readily than that which is simply gained by routine exercise upon the drill-ground, or perhaps even by hard study.*

* *Standard Text-Books and Authorities.*—United States (authorized) Tactics—Infantry, Cavalry, and Artillery. Editions of 1874-'80. D. Appleton & Co. 24mo. "Field Exercise and Evolutions of Infantry, as Revised by Her Majesty's Command." London, 1874. 16mo. "The Elementary Tactics of the Prussian Infantry." Authorized Translation. London, 1872. Pamph. Royal 8vo. "A Treatise on Drill and Manœuvres of Cavalry combined with Horse Artillery." By Major-General M. W. Smith, C. B. London, 1865. 8vo.

N. B. "Précis of Modern Tactics." By Major Home, R. E. London: A. S. King & Co.

THE GRAND TACTICAL GAME.

*TEXT-BOOK ILLUSTRATION, TOPOGRAPHY, STRATEGY, AND
HISTORY.*

THE GRAND TACTICAL GAME.

11. But it is in the study of Grand Tactics and Strategy that the use of these various pieces will afford the most valuable assistance to the ardent military student. With them he can more readily and understandingly master the definitions and principles of the Science of War, and, upon these as a foundation, still further investigate the many considerations which affect and vary their applications in the practical experience of campaigning. With them he can study and compare the composition of armies, examine the relative strength of our own and foreign organizations, investigate the rules that govern grand movements, dispositions for marching in advance, to the flank, and in retreat, simultaneous movements, diversions, and the various special operations of war. With them he can study the influence of mountains, rivers, forests, swamps, villages, field-works, fortified places, etc. With their assistance he can investigate the various battle formations for offense and defense, the advantages and defects of the Twelve Orders of Battle, and how topographical considerations may modify them. And finally he can employ the various parts of the outfit in practically illustrating any of the conditions and problems of field service in time of war, such as camping, cantoning, establishing outposts, grand guards, sieges, etc.

12. In this branch of study the large Game-board must be regarded as a blank sheet upon which the various topographical and military pieces may be arbitrarily placed so as to best illustrate the text-book, campaign, or other subject under consideration at the time. The Game-board, however, is not

essential in this part of the study, as any large table will afford convenient opportunity for locating the blocks to suit the subject under consideration at the time.

13. Few pencils have the skill or time to supplement extensive military reading and study. This is especially the case in the brief time allotted to a recitation ; and where diagrams are too expensive, or from the very nature of the case entirely out of the question, one often has to forego that benefit which is only to be derived from copious illustration.

14. It is particularly to meet this great want of the military *student* that the game of Strategos is now published. It offers to every one engaged in the study of military science and history that ready, simple, and unlimited means of *illustration* so much needed.

15. All of the larger pieces accompanying the outfit are slated upon one side, and have topographical delineations upon the other, the proper military symbols being employed. By examining these pieces, the inter-relations existing between them, particularly between those of the same order, and their special adaptability to topographical representations, will become apparent. For instance, a single piece representing a *bluff* may be combined with several of the same kind, and the representation be thus made to double or triple its extent. Again, they may be so arranged as to represent a valley between two opposite heights ; or, by still further varying the arrangement, a single hill, large or small, or a line of hills or mountains, will result. By a corresponding arrangement of the river-pieces (see Fig. 6, Plate I), a stream as direct as an arrow or as crooked as the Meander may be represented, its length being varied from one to several yards to suit circumstances. Similar employment may be made of the other pieces representing woods, swamps, etc.

16. Moreover, where any such special alterations in the arrangement as do not come within the capacity of the set are needed, or where more of a kind are needed than are furnished in the outfit, it will only be necessary to turn the slated sides of the extra pieces up and delineate upon them whatever is necessary to suit such circumstances.

17. In the further prosecution of this most important subject, and where the pencil can be even passably depended upon, it is suggested that the large board furnished with the game be extensively employed. It has been slated expressly with a view to topographical delineation and study. Upon it rude

maps of various battle-fields and campaign-theatres may be sketched, and, by placing suitable military pieces in position, it is manifest that any engagement or grand strategic movement may be consecutively followed thereon from beginning to end. It must also be clear that, in this simple way, the study of a military subject may be carried on in a manner which otherwise could hardly be attempted without a most extensive and expensive system of diagrams to suit each case.

18. With such a board and the simple topographical blocks and military pieces in the outfit, the illustration of any military topic will be limited only by the subject itself, while it will at the same time possess the peculiar advantages of the panorama and the tableau, any and every feature of which may be modified at will.

19. Thus the various pieces will accommodate themselves to the practical illustration of all the numerous topographical and strategical combinations which come up in the study of the art of war.

20. Any of the various diagrams found in the well-known text-books of Jomini, Hamley, Dufour, Mahan, Halleck, Wheeler, Wolseley, Lippitt and other writers upon Strategy, Grand Tactics, Military History, etc., may thus be graphically represented—a feature no less valuable to the advanced student than to the beginner (see Fig. 6, Plate I).*

21. It must not be overlooked, in this connection, that upon nearly every page of such authorities numerous fit subjects for illustration are to be found, which, though not even attempted *there*, may with this outfit be easily realized to the student's manifest advantage.

22. Of course, in the representation of such large bodies of troops as armies or corps in line of battle, columns of march, etc., it will be necessary to have some standard unit, adapted not only to the convenience of the student, but also to the capacity of the outfit. Both of these considerations have been studied in forming the following table of equivalents.

It is not, however, intended that the values hereafter assumed shall be

* In this figure we have reproduced two separate ones, which occur in Dufour's "Strategy and Grand Tactics" (see pages 205 and 189 of that volume). The *red* army, E D B A, is drawn up in a strong defensive position, while the *blue* army, Y F G K L, is advancing to attack its key positions. This diagram is simply introduced to show how *readily* the principles of Military Science may be illustrated by the system. It should be recalled here that the blocks which now represent *brigades*, in Figs. 1 and 2 were "Single Ranks of Four," in Figs. 4 and 5 were Platoons, etc. The *Battery Pieces* employed in this diagram, Fig. 6, belong to the Battle Game (all, however, are in the same outfit). This diagram is again considered in connection with the Battle Game (see ¶ 218, etc.).

rigidly adhered to in all cases. The matter is left entirely with the student, as a suggestion to be altered, if necessary, according to circumstances.

TABLE OF EQUIVALENTS.

For Use in the Study of Grand Tactics and in the Battle Game.

1. A Company, Detachment, Gun, or minor tactical division of either arm may be represented by a single appropriate military piece (Figs. 1-14, Plate II).

2. The Battalion regarded as a *unit* of the line of battle will generally be represented by two slated Infantry pieces (Fig. 1, Plate II). In the Battle Game, these pieces are to be placed upon the same square if the Battalion be ployed or closed in mass, in which case in this game they may move as a single piece; but, if deployed as would generally be the case in the front line of battle, they will be touching each other and occupying two separate squares.

3. A Brigade of Infantry by 3 or 4 Battalions—6 or 8 pieces.

4. A Brigade of Infantry, to be employed for skirmishing purposes, by four (4) Battalions of 4 pieces each, or 16 pieces.*

5. A Division by three Brigades—9 or 12 Battalions, 18 to 24 pieces.

6. A Brigade of Artillery by 10 Batteries, that is, by 10 pieces.

7. A "Division of the line" consists of 3 Brigades of Infantry and 2 Batteries of Artillery, i. e., 12 Battalions and 2 Batteries equal to 24 Infantry pieces and 2 Artillery pieces.

8. A Division of Cavalry consists of 2 Brigades and 2 Batteries, i. e., 6 Regiments of Cavalry, and 2 Batteries of Artillery, or, estimating each Cavalry Regiment at 3 pieces (Fig. 5, Plate II), the whole division will be represented by 18 Cavalry pieces and 2 Horse Artillery pieces.

9. Officers, sentries, scouts, messengers, squads, and, in general, all special details will be designated by name, rank, and chevron upon the round, or other suitable slated pieces.

23. General Upton has laid down the tactical standard for the strength

* In the Battle Game the special skirmish-pieces need not be introduced, but the rule just given may be followed. For the Advanced Game, however, the special pieces are provided, q. v.

of "the Three Arms" in an independent Army Corps as follows (see Appendix C):

36 Battalions of Infantry.

6 Regiments of Cavalry.

108 Guns, or 18 Batteries.

Following, therefore, the above table of equivalents, we may represent such a Corps by

72 Infantry pieces,

18 Cavalry "

18 Artillery "

or, if we wish to regard 6 Battalions of Infantry and 2 Regiments of Cavalry as employed for *light* purposes, we may represent the Corps as follows:

30 Battalions Infantry by 60 Infantry pieces, 30,000 men.

6 " " 24 " " 6,000 "

4 Regiments Cavalry by 12 Cavalry " 4,800 "

2 " " 10 " " 2,400 "

18 Batteries Artillery by 18 Artillery " 108 guns.

To the above we may add a convenient number of standards (12, or 1 to each Brigade), 1 Commander-in-Chief, 4 General Officers, 8 Staff Department pieces, 4 Engineer Companies, 2 for the Ordnance Department, 24 for Baggage, and complete the representation by adding in proper proportions suitable slated pieces for Siege Artillery or Batteries of Position.

24. Numerous extra pieces will be found in the outfit, which, together with the longer slated Tactical pieces (to which any values whatsoever may be assigned) can be used to raise the capacity of representation to any desired limit.

25. It is clear that the small Regular Army of the United States as laid down in the Army Register (see Appendix G, Table *b*) will find the most ample representation, even with a more generous *unit*, by employing this outfit.

26. To represent the standard Army Corps assumed by Dufour in his "Strategy and Grand Tactics," there are needed but 110 Infantry, 16 Artillery, and 12 Cavalry, pieces, besides a small number of Staff and other general pieces. So, also, the standard English Army Corps, as given by Sir Garnet Wolseley ("Soldier's Pocket-book," pages 88 and 214), will find ample representation in the outfit, requiring but 102 Infantry, 18 Artillery, and 18 Cavalry pieces, besides a suitable number of general and miscellaneous pieces.

27. Of course, the larger the army to be represented the smaller should be our *unit*; and it is, perhaps, needless to state that, when studying *Campaigns* as such upon the slated-board, armies may be represented by small clusters of "the Three Arms" proportional to their several strengths, and in some cases even by single stands of colors, or by slated pieces properly designated as to strength, etc.

28. With an outfit, therefore, of such elastic capacity, there can certainly be no difficulty experienced in representing the various ancient and modern armies in any of their phases of formation, in accurately delineating the grand orders of battle,* and even studying the latter, over against each other, either arbitrarily, or according to the principles now to be considered under the head of the "Battle Game." †

* For valuable discussions of the Twelve Orders of Battle, see Jomini's "Art of War," translated by Mendell and Craighill, U. S. Engineers. Philadelphia: Lippincott & Co. Edition of 1873. Also Halleck's "Elements of Military Art and Science." New York: D. Appleton & Co., 1861; and others, such as Wheeler, Mahan, etc.

† *A few selected Authorities upon Grand Tactics, Strategy, etc.*—Jomini's "Art of War." Translation. Lippincott & Co. 1873. Hamley's "Operations of War." London, 1872. Third edition. 4to. "Studies in Troop-Leading." Colonel I. Von Verdy du Vernois. Translation. London, 1872-'79. 8vo. (Four several parts.) "The System of Field Manœuvres best adapted for enabling our Troops to meet a Continental Army." [Wellington prize essay.] Lieutenant F. Maurice, R. A. London, 1872. 12mo. "On the Theory and Practice of Peace Manœuvres with their Relations to Real Warfare." By Lieutenant-Colonel C. C. Chesney, R. E. London, 1872. Pamphlet. 8vo. "The Frontal—Attack of Infantry." Translated from the German by Colonel Edward Newdigate. London, 1873. 12mo. "The March of Army Corps." London, 1873. Pamphlet. 8vo. Duffour's "Strategy and Grand Tactics." Craighill. D. Van Nostrand, publisher. 1864. Halleck's "Elements of Military Art and Science." D. Appleton & Co. 1861. Lippitt's "Tactical Use of the Three Arms," "Field Service in Time of War," and "Special Operations of War." D. Van Nostrand. Mahan's "Outpost." John Wiley & Son. 1870. G. O. No. 69, Headquarters, Army of the Potomac. 1862. Wheeler's [Professor at U. S. Military Academy] "Art of War." "Lessons of War as taught by the Great Masters." France I. Soady, Lieutenant-Colonel, R. A. London: Wm. H. Allen & Co. 1870. "The Military Aspect of Canada." Ord. Notes, No. 120. "Tactical Deductions from the War of 1870-'71." By A. Van Boguslawski, Captain. Translated from the German by Colonel Lumley Graham. London, 1872. "Plan of the Battle of Sedan, accompanied by a Short Memoir." By Captain Fritz-George. London, 1871.

THE BATTLE GAME

FOR STUDYING THE PRINCIPLES OF STRATEGY AND GRAND TACTICS.

THE BATTLE GAME.

INTRODUCTION.

29. As in the broad field of Strategy, so in the less extended one of Grand Tactics, that "Plan of Operations" is best, which, other things being equal, succeeds in throwing superior forces upon decisive points at opportune moments. The skillful general upon the field of battle must study manœuvre and concentration as deeply as he does the proper use of "the Three Arms." The latter in reality comes under the dominion of *fixed* rules ; while plans of battle, being within the domain of grand tactics and strategy, can not be wholly subjected to anything fixed, but tax particularly that faculty which we call *generalship* for their individual solution.

30. In the Battle Game here offered, the aim has been to throw the result upon the successful realization of some definite plan rather than entirely upon the individual strength assigned to the pieces representing "the Three Arms."

31. In every game based upon realities, and especially such complicated ones as those of war, the rules and relations between the pieces, etc., must necessarily be somewhat arbitrary ; nevertheless, in framing the ones connected with the *Battle Game*, it has been studied to approach as nearly as possible to the conditions of actual experience.

32. A game of war can not avoid a certain amount of complication ; it must partake of the nature of its archetype. It is, however, fairly to be presumed that the terms and expressions hereinafter to be given will not con-

fuse any military man, already even moderately familiar with the elements of his profession, nor can the novice in these premises reasonably expect simpler results, and at the same time hope to derive any *benefit* from the study of the game. As the pieces themselves may not be endued with intelligence, and as it was necessary to draw the lines somewhere, it is believed that the special rules herein furnished will be found both to suggest and follow real experience more or less closely. However, it is by no means necessary that a perfect correspondence should exist in such a case ; it is sufficient if in its general realization only the more important principles, definitions, arrangements and requirements are preserved. This is all that has been attempted in the simple Battle Game. Upon the basis furnished, however, ample scope is given for the most indefinite extension that can be desired, and *such amplification it is expected that the advanced student* will make for himself. This is beyond the domain of arbitrary ruling, and must always adapt itself to circumstances.

CHAPTER I.

THE BOARD AND PIECES GENERALLY CONSIDERED.

1. THE BOARD AND GENERAL ARRANGEMENTS.

33. THE Battle Game is to be played upon the large slated game-board furnished with the outfit. [See outfit.] This board is regarded as representing a level surface without any "Natural Supports" whatsoever. The board is divided up into 1,920 elementary squares, each of which is an inch on a side. It is not exactly square itself, but is 48 inches wide by 40 inches deep, the longer dimension being placed with the length of a table and the players occupying the middles of its long sides.

Plate III gives a representation of this Game-board. The four elementary parts of which it is composed join along the lines *A B* and *C D*, and severally fold up along the lines *E F* and *G H*. The players sit at *C* and *D*; the screen extends from *A* to *B*. A careful examination of this diagram will greatly assist the reader. (N. B. In the minor sets only one of these elementary boards is furnished.)

34. For the purpose of more accurately representing the distribution of troops upon this board, each of these squares is regarded as being 150 yards wide and 150 yards deep.

35. The belt of squares four inches wide and extending across the center of the board from left to right between the players is regarded as Middle Ground, and is supposed to represent a section of country 2,400 yards in width.

36. Hence, the whole board comprises a section 7,200 yards wide by 7,800 yards deep. The belt of middle ground thus divides this whole section up into two equal *Sites*, one being on each side of it, and both of which will afford ample room (7,200 yards long by 2,700 deep) for the

proper distribution, in battle order, of either of the armies previously considered.*

37. In arranging two hostile armies upon this board, the Middle Ground should be left unoccupied.

38. The skirmishers of the two armies, each one on its own side of the board, may occupy the next lines of squares, after which a single line of squares should be left vacant, followed immediately by the first Line of Battle. Each army will thus occupy in its front Line of Battle a part or the whole of a third line of squares from the Middle Ground.

39. The minimum distance between the two armies at the opening of the action will then be about 3,000 yards, not including in this estimate any part of the depth of squares occupied by the first Line of Battle of each army.

40. The distance between the lines in which each army is drawn up should be about 300 yards; if, therefore, we regard one half of the depth of the squares occupied by the Lines of Battle as coming into this estimation, a distance of one square between these lines will satisfy this requirement.

41. The reserve may be located in accordance with any suitable plan, either as laid down by authority or conceived by the player, but its distance to the rear of the second Line of Battle should be about 1,000 yards, or seven squares measured in the clear.

42. The above distances are not arbitrary, but are based upon proper calculations for disposition; *they may, however, be altered for cause and to suit circumstances and convenience.* It should be remembered, however, that the conditions under which we are now considering these armies are those of equality upon an *Open Plain* and are thus of the very simplest order. This general arrangement, however, by no means requires that the armies shall be in parallel order; any part of the opposing lines may be refused, the same general distances being observed. Nor is it expected or necessary that the armies should spread out across the entire board; they must protect their flanks lest they be turned, but may accomplish this end by any approved method or arrangement, conforming, however, always to some one of the various modes that have resulted from experience in war, or are suggested by the study of its science.

* See Wolseley's "Soldier's Pocket-book," 2d edition, page 214; Hamley's "Operations of War," page 372; Upton's "Infantry Tactics," § 718 and § 743, and other authorities on disposition of troops.

43. For the benefit of such as have within their reach no standard authorities upon the organization of armies, and their proper distribution in Battle-order, Plate III shows the method of arranging upon the regular Game-board an Army Corps in two different "Orders" of battle.

The arrangement shown on one half of the board (A, B, H, D, F, A) represents a simple distribution in parallel order (see Sir Garnet Wolseley's "Soldier's Pocket-book," second edition) of an independent tactical Army Corps (in strength as laid down by Upton; see "Infantry Tactics," § 748, edition of 1874).

44. Appendices B, C, and G, and Plate III, will also assist beginners in obtaining a correct idea of the general subject of military strength and the systems of organization in our own country. These appendices should be followed in the preliminaries for a Battle Game until the principles involved are thoroughly understood.

45. In playing the Battle Game, the two armies will be drawn up against each other according to this diagram as a basis, any modifications thereof being required to follow sound military principles. For instance, the other half (A, B, G, C, E, A), Plate III, shows an army of the same strength arranged to attack by its right wing, its left being refused, and the reserve being drawn aside to the right wing (see Dufour's "Strategy and Grand Tactics").

46. While studying the following pages in order to become familiar with the rules, captures, moves, etc., it is suggested that a small section of the Game-board only be employed, and that the Battle Game be fought with as few *men* as possible (say a division on each side). (For the proper methods of drawing up a "Division of the Line" in Order of Battle, consult "Infantry Tactics," § 718.) This method will rapidly familiarize the student with the rules, strength, character, etc., of the several pieces, after which the regular Battle Game may be fought upon as large a scale as desired, and without fear of the confusion resulting from undertaking to learn too much at once. It should also be noted here that the extent of the board may be unlimited, and that additional sections properly placed will give ample room for flank movements or extensions.

2. THE PIECES IN GENERAL, SQUARES, ETC.

47. The various military pieces may be readily distinguished by their shape and size, and by the respective insignia of their rank or character, which should then be put upon them.*

48. Each piece will habitually occupy a single square unless *ployed* with another of its own order, in which case two of a kind may occupy a single square; they being placed one upon the other, if necessary. (N. B. Any piece, friend or foe, may occupy the same square with a stand of colors.)

49. The numerical values of the pieces are as follows: Infantry, 5; Ordnance, 15; Commander-in-chief, 100; Cavalry, 10; Cadets, 15; Flags, 10; Artillery, 15; Staff, 25; Baggage, 25; Engineers, 20; Generals, 50; Field-works, 50. These arbitrary values are to be employed in estimating strength, losses, arranging exchanges, forfeitures, disputes, etc., and in the settlement of such other kindred matters as may arise in the course of the Battle Game, but are not otherwise important.

3. DEFINITIONS.

50. A piece is said to *occupy* a square when it stands upon it.

51. A piece *commands* or *covers* only such squares as come under its *fire*; hence a piece may or may not command the squares within its regular move according as its fire extends over the same squares or not.

52. A square is covered in *potence* (Figs. 7 and 8, Plate IV) when it is commanded by two pieces. It is covered in *double potence* when commanded by four pieces.

53. Opposing pieces, one or both of which are covered by the other, are said to be *in action*.

54. If two such pieces, each being of the infantry, artillery, or engineer order, are mutually under fire, they are said to *neutralize* each other, i. e., they have not surplus power enough to effect captures, either as against each other or against pieces of different orders.

55. If two pieces, of the infantry or artillery order, cover a single hostile one of the same order, a *preponderance* is gained, and one of the pieces, though in action, is said to be *free*.

* See Plate II, also Appendix A.

56. The piece over which a preponderance is thus gained is said to be *overwhelmed*.

57. A piece which is free may capture a hostile one of any order (see ¶ 74, etc.) which it covers; the latter piece is said to be *threatened* by the former.

58. A piece covered by a friendly one is said to be *protected* thereby; but this protection does not necessarily give the covered piece immunity from capture, though it may not be captured without the risk of retaliation, as in chess.

59. A piece *controls* a square to the prejudice of a hostile one, which covers such square when it neutralizes the command of the latter, and at the same time establishes its own command over such square. (See Engineer piece, and Fig. 13, Plate IV.)

60. Squares are said to be *contiguous* when they have a side in common; they are *adjacent* if they touch each other at all. Thus, of any nine elementary squares which unite to form a larger one, eight are adjacent to the central square, and but four of them (not the corner ones) are contiguous thereto.

61. Distances measured on the board are said to be *direct* when they run with the squares forward, backward, or sideways. They are said to be *oblique* when they run diagonally.

62. The fire of a piece is said to be *direct* when it is toward its *proper front*. Thus a piece may *face obliquely*, and yet *fire directly* along a diagonal of the board. (See Figs. 6, 8, 11, and 15, Plate IV.)

4. MOVES.

63. The moves assigned to the various pieces in the Battle Game may be classed under two general heads—Regular moves and Manœuvre moves.

a. REGULAR MOVES.

64. There are but three kinds of *Regular moves*, called respectively the *Infantry*, the *Cavalry*, and the *Artillery move*.

These will be found fully explained under the several heads—Infantry, Cavalry, and Artillery piece. (See Figs. 2, 3, and 4, Plate IV.)

65. Pieces of the other orders have one of the above-mentioned moves *assigned* to them, as will be found laid down for each under its proper head.

66. By their Regular moves pieces can not pass over squares occupied by hostile ones, except the latter be Stands of Colors.

67. By their Regular moves the Cavalry piece and the Commander-in-chief may jump squares occupied by friendly ones of any order.

68. Pieces in action must always make use of their Regular moves in effecting changes of position.

b. MANŒUVRE MOVE.

69. There is but one kind of *Manœuvre move*, it being the common privilege of all the pieces (except the Field-work—see also Colors, which are somewhat restricted in this privilege), without respect to their order.

70. This move consists of *one square at a time in any direction* (see Fig. 1, Plate IV), but can *not* be taken advantage of by pieces that are already in action.

71. Ployed pieces can make use of this move, but only over unoccupied squares ; they may also deploy by it if not already in action.

72. By the Manœuvre move single pieces may pass over unoccupied squares (unless these squares be covered by hostile ones, free or neutralized), and over such as are occupied by single pieces of their own order, unless such latter be in action, when it will require a Regular move to leave the square so occupied.

73. By the Manœuvre move a piece may not pass over any square occupied by one of a *different* order (colors excepted).

5. CAPTURES.

74. Hostile pieces are put *hors de combat*, *captured*, etc., etc., according to the various rules laid down under the heads of the several pieces, q. v. (See also under head of Counters, also Plate IV, Figs. 5 to 15 inclusive.)

75. A piece, having put another *hors de combat*, may not thereafter (i. e., during the same turn) be moved. It must be inverted (or otherwise designated) upon its square until the current turn is ended.

76. Pieces (except Artillery and Field-works) can not effect more than *one* capture in a single turn. This rule comprises all such as put hostile ones *hors de combat* by displacement.

77. Ployed pieces have no offensive power, i. e., can not threaten or

capture ; if threatened, they must deploy, the top piece making its regular move to an unoccupied square. If such deployment be impossible, or be neglected, the top piece may be arbitrarily removed by the opponent, and the under piece be neutralized, put *hors de combat*, etc., as the case may be by the threatening piece.

78. Captures are always in order during the continuance of a turn. They should, however, usually open the turn in order to save points. (See Counters, ¶ 83, etc.)

79. Captures are not compulsory.

6. TURNS.

80. The opponents are to play alternately, each turn entitling a player to the following privileges, which, unless otherwise excepted, *must be employed in the order enumerated below* :

1. The turn may be *waived*, in which case the regular counter pertaining to it must be forfeited to the opponent, whose regular counter may be thrown into his reserve. If the turn be not waived, it will be employed as follows :

2. *Pay all necessary forfeitures.* This rule is general, and, so long as any part of a forfeiture remains due, a portion of the points of every counter played (reserve counters included), to the extent of one half their value, if necessary, must be expended in canceling it. A forfeiture may thus extend over several turns, but no forfeiture can affect more than half the points played in any one turn.

3. Make such *arbitrary* captures as are possible. Such captures do not necessitate the expenditures of any points.

4. Expend the remaining points of the regular counter. (See Counters, ¶ 83, etc.)

5. One or two reserve counters may be expended. (See Reserve Counters, ¶ 88, etc.)

81. During that part of the game devoted to *Skirmishing*, a turn is limited to a single capture, or to a single Regular or Manœuvre move, as the player may elect.

82. A turn is *limited in time* to ten (10) minutes * per counter, and all

* Five minutes a turn is the average time required by skillful players of chess.

points unexpended at the expiration of that limit are to be forfeited to the opponent.

The length of this limit may be altered by agreement.

7. COUNTERS.

83. Each player is provided with a set of counters or checks, which are valued at 50 points each. The red and blue slated disks will be used for this purpose, and, to avoid confusion, the players should take those of the opposite color as counters.*

a. REGULAR COUNTER.

84. Each turn entitles the player to expend one counter, called the *Regular Counter* and one or two reserve counters, if desirable.

85. The method of expenditure is as follows :

1. *Forfeitures* are to be paid.

2. *Captures* are to be made costing five (5) points each. (See Colors, ¶ 124, etc.)

No moves should be made until after all the captures desired have been effected.

If, however, any piece shall have been moved, and it be thereafter desirable to effect a capture, it may be made ; but each one so effected shall cost twenty (20) points.

* Record should be kept of the number of points expended out of each counter upon the counter itself (slate), in order to avoid confusion and mistakes. In this way, if it be necessary to suspend the game for a length of time, it may be resumed at any stage by consulting the counter under process of expenditure.

N. B. Dice. By the employment of *dice* instead of, or in connection with counters, in the Battle Game, a semblance may be gained of that uncertainty which, in spite of generalship, so often turns the scale of fortune on the field. Counters, for instance, may be used as a reserve, subject to certain rules, while dice are employed to determine the number of points to be played in the regular turn, or *vice versa*. Dice, of course, introduce into the play a very large element of *chance*, but in so doing copy more or less from actual experience, and offer opportunity for the display of the same skill which must so often be taxed to baffle misfortune and uncertainty upon the battle-field itself. It will be found, however, that the employment of dice will generally bring into the Battle Game rather too much of chance, and it is thought that the use of counters alone is preferable. Correctly understood, this method of playing by counters having a fixed value in points is in keeping with the run of such a Battle Game (i. e., a theoretical one). The players start out with *equal* armies, dispose them to suit their *own ideas*, upon a *level* plain, and equal discipline, nerve, and power being accorded to the various pieces upon each side, and (of course the same rules and restrictions governing all concerned) with equal *points* to play, the judicious expenditure of these points with a view to securing the end desired becomes paramount. A counter represents therefore so much *power, ability, reserve resource*.

The use of dice in the Advanced Game is for an entirely different purpose, and will there be found to be strikingly valuable and necessary.

If any piece be moved into a position, and it be desirable to effect a capture *therewith* in the same turn, such capture shall cost forty (40) points.

Standards and Commanders-in-chief, however, may be captured only at the commencement of a player's turn and before any moves have been effected.

3. *Moves* are now in order, and continue to be so until the turn is completed. They may be either Regular or Manœuvre moves at will, and according to circumstances.

86. The Cavalry, Infantry, and Artillery Regular moves, if *forward* or *sideways*, cost respectively 2, 3, and 5 points per square; if in *retreat*, they will severally (except Cavalry) cost double; i. e., Infantry 6 and Artillery 10 points per square.

87. A Manœuvre move *forward* or *sideways* costs 1 point; if in *retreat** it costs *double*, two (2) points.

b. RESERVE COUNTERS.

88. At the commencement of a game, each player may place with his reserve two (2) counters, which will constitute the basis of his reserve power.

89. The strength of this reserve is to be still further increased by adding thereto every fifth counter, after it has been played in regular turn, also every forfeiture incurred by the opposite side.

90. Any number of these reserve points, not to exceed one hundred in a turn, *may* be expended in addition to the regular counter pertaining to that turn, the expenditure being left to the discretion of each player, and will of course be governed by circumstances; but no unexpended points of the regular counters can be added to this reserve.†

91. This reserve power constitutes a valuable fund against the tide of disaster, or it may materially assist the player in the realization of some decided advantage, either already comprehended in the plan of battle, or which in the course of the game may offer itself.

* N. B. Retreat means "from the enemy." Its direction may alter, and be different upon different parts of the board. (Referee.)

† An interesting change, and one in which *dice* may be employed to indicate points, may be played as follows: Each reserve point may be regarded as giving the player one throw of a die, and the number of spots turning up will indicate his reserve strength. When this method of obtaining reserve force is adopted in the Battle Game, not more than forty (40) reserve points can be thus exchanged for throws, and expended in any single turn.

CHAPTER II.

THE PIECES INDIVIDUALLY CONSIDERED.

1. INTRODUCTORY REMARKS.

92. Although the assignment of particular *moves* and *strength* to the several orders of pieces has necessarily been more or less arbitrary, still it has been endeavored to secure relations as *similar* as possible to those which exist between the originals themselves. This has been done with a view to making the game as little arbitrary as possible to the *military man*, and to assisting the *student* in acquiring correct ideas of the relative importance of the various elements that go to compose an army and their different moves, powers, and uses. For instance, but three kinds of Regular moves will have to be remembered, these being regarded as corresponding to movements on *foot*, on *horseback*, or on *wheels*, and having received the designation of the Infantry, the Cavalry, and the Artillery move respectively. Another move, common to all, and called the Manœuvre move, has been introduced to facilitate manœuvres, concentrations, and arrangements upon the board, and finds its correspondence, to things in actual service, in those extended movements of columns composed of all arms which precede battles and occupy all campaigns, in the difference between movements of troops under *fire* and of those beyond the reach of hostile cannon, and, finally, in that assimilation of the tactics of "the Three Arms" which has now become an American military feature. A similar difference will be found to exist between the powers of "the Three Arms," depending upon their weapons, methods of attack, special importance, etc.

93. The *numerical strengths* of the pieces of "the Three Arms," with which the Battle Game is to be played, are those taken as equivalents in the Advanced Game (see note to Case 3, Table S). The maximum numbers of

squares over which each of these pieces can manœuvre in a single turn, have been so coördinated as to make the *power of concentrating* upon the board at least relative to that upon the field. The various expenditures of points, by means of which the progress of the game is more or less influenced, are graduated with a view to represent in general terms the ratios of *possibility* and *chances of success*, results and consequences, the relative degrees of difficulty with which various operations are performed in action, etc. Finally, the *effective reaches* of the powers of the several pieces employed, though they have been scaled down to facilitate the study of *command*, *neutralization*, *preponderance*, etc., have nevertheless been relatively preserved with a view to similar ends.

94. In this connection it may be here stated that the same *coup d'œil*, which is regarded as the criterion of ability upon the field of battle, will find at least a relative opportunity for display over the Game-board with its far cooler deliberations. He who can not keep the various points of a Battle Game in his mind certainly can not hope to remember military precepts amid the excitements of action itself.

2. THE LINE.

95. "The Three Arms" of the service are Infantry, Cavalry, and Artillery.*

These constitute the main and combatant part of every army, or its *line*.

a. INFANTRY PIECE.

96. This arm has been rightly termed the "Queen of Battles." Its strength comes especially from the number of its disciplined units, which constitutes about four-fifths of the fighting *personnel* of an average army.

97. The Infantry piece to be employed in the Battle Game is the *half Battalion* (Fig. 1, Plate II). It is made of wood, and is silicated upon its top surface.

98. Its *Regular move* (see Fig. 2, Plate IV) is *one square at a time directly forward, backward, or sideways*. This move requires the expen-

* "Artillery prepares the victory, Infantry achieves it, Cavalry completes it and secures its fruits. . . . Artillery as an arm is mainly defensive; Cavalry offensive; and Infantry both offensive and defensive."—LIPPITT.

diture of 3 points, if made to the front or sides, or double that number (6), if to the rear (i. e., its own rear).

99. The range or power of this piece extends over 14 squares, to wit : *the ones whose centers are included in the arc described from the center of its own square with a radius equal to the diagonal of 2 squares.* (See Figs. 5 and 6, Plate IV.) (N. B. Directly to its flanks its power extends only over the adjacent squares.)

100. The Infantry piece puts hostile ones *hors de combat* by displacement, moving to and ousting hostile pieces from any one of the above determined squares. In making such displacements from adjacent squares, it is regarded as acting with the bayonet and its moral weight ; its cover over the second or more distant squares is due to its fire.

101. Free Infantry pieces, only, have this power of displacing hostile ones venturing upon such squares, and may move over friendly ones of any order in so doing, but may not move over hostile pieces in effecting displacements, even though such latter pieces be neutralized or overwhelmed. It requires the expenditure of 5 points to effect such displacements.

102. During that portion of the Battle Game designated as the *General Engagement*, Infantry pieces may only effect the displacement of hostile Infantry ones by securing decisive concentrations. Thus, two opposing Infantry pieces, mutually engaged, are then considered to be powerless to displace each other, or, indeed, even to use their fire against threatening pieces of their own or other arms. So soon, however, as either side secures the fire of a second Infantry piece upon its opponent, the latter must retire, or, failing to be similarly reënforced, will be subject to displacement, and to be thus put *hors de combat*. So long, therefore, as opposing Infantry pieces may be actually paired off, their fire will be regarded as neutralized, or, rather, so mutually under control as to lack decisiveness anywhere.

103. During the *Skirmish turns*, however, this law of decisive concentrations shall not be regarded as in force, and either of two or more Infantry pieces mutually threatening each other may or may not effect displacements according to the will of the players.

104. If, at the opening of a turn, two Infantry pieces, not otherwise engaged (see Figs. 5, 7, and 8, Plate IV) (i. e., free), hold a hostile piece (two squares distant) under their *cross-fire*, they may put it *hors de combat* without either of them being moved to displace it, and such captures are not

to be regarded as incapacitating either of these pieces for moving or effecting displacements thereafter, i. e., during the same turn. The same Infantry piece can effect but one displacement in a turn.

105. Infantry may be detached for the purpose of creating diversions around the enemy's flanks, etc. ; but in such cases the strength of the detachment (which may of course contain other "arms") must be maintained at not less than 50 points, under a penalty of forfeiting 25 points each turn until such detachment be reënforced, if reduced below the minimum, or until it returns within supporting distance of its own lines. This rule is not intended to interfere in any way with a deliberate extension of the active Line of Battle so as to overlap and envelop an enemy's flank, so long as supporting distances (Referee) are maintained, but as a check to indecisive annoyance, whereby mere advantage is sought to be taken of the Game Rules to the disadvantage of the military principles endeavored to be set forth thereby.

106. By *supporting distance* is understood the range, cover, or protection of a friendly supporting body. The need of supporting bodies, however, may be questioned (Referee) when the opponent is not strong enough in the same locality to dispute such detachments.

D. CAVALRY PIECE.

107. Cavalry has been aptly termed "the eyes and ears of an army." Though its proportion is generally small (the normal allowance being about one-fifth that of the Infantry), this arm is an extremely important one, and is particularly effective when properly employed. It is, essentially, a harasser.

108. The piece to be used in the Battle Game represents a Battalion in column of companies (see Fig. 5, Plate II). It is made of wood, and siliated upon its upper surface.

109. Its *Regular move* (see Fig. 3, Plate IV) is very eccentric—*two squares diagonally, and then one square forward, backward, or sideways*—somewhat similar to that of the Knight in chess, but more extended. This move *requires* the expenditure of (6) points (or is at the rate of two [2] per square passed over).

110. The Cavalry piece can jump over intermediate *friendly* ones of any order, and is not subjected to the restrictions placed upon other pieces as to support, nor disadvantaged by *double* expenditures of points when moving

to the rear, etc. It is the only piece that can dare to act in small parties, raiding around an enemy's flanks with impunity unless prevented by proper counter dispositions.

111. The Cavalry piece acts by its *shock*. It puts hostile ones *hors de combat* by displacement, commanding for this purpose every square to which it may jump by *moving one square diagonally, and then one square forward, backward, or sideways* (Fig. 9, Plate IV).

112. In the turn immediately succeeding the one in which it has effected a displacement, a Cavalry piece is entitled to but one move—a single *Regular* one to the actual rear.

113. The Cavalry piece may not be employed against Field-works nor Intrenchments, unless the latter be regarded as open in their rear, in which case Cavalry must take them in reverse (i. e., from some square in the sector without fire).*

c. ARTILLERY PIECE.

114. The proportion in which this most valuable arm enters into the composition of an army is very uncertain, varying anywhere from 1 to 6 guns per 1,000 men of Infantry and Cavalry combined. The ordinary limits however, are from 2 to 6 guns per 1,000 men (*vide* authorities).

115. The piece to be employed in the Battle Game is the Battery (Fig. 6, Plate II). It is made of wood, and silicated upon its top surface.

116. The *Regular move of the Artillery piece* (see Fig. 4, Plate IV) is *one square at a time diagonally forward or backward*, and requires the expenditure of 5 points if made to the front, and of 10 points (i. e., double) if to its rear.

117. Artillery can not advance more than two squares beyond the general Line of Battle, unless supported by one or both of the other arms, under penalty of a 25 point forfeiture each turn that such a condition of affairs exists. The entire strength of a force making such an advance must be represented by at least 50 points (see ¶ 105).

118. Artillery has no power of displacement (i. e., of ousting hostile

* In effecting its *Regular move* or its *capture*, the Cavalry piece is supposed to *move over the diagonal squares* embraced in its line of march or attack; hence, if either of such squares be occupied by hostile pieces, Cavalry can not make a *Regular move* in their direction; if, moreover, an adjacent diagonal square be so occupied, Cavalry can not effect a *capture* in such direction. By occupying then the four diagonal squares adjacent to a hostile Cavalry piece, it may be *surrounded* and (according to the circumstances of *action, neutralization, preponderance*, etc.) perhaps eventually put *hors de combat*.

pieces from their squares by moving on them), nor has it any command over the squares adjacent to the one it occupies, nor over those directly to its flanks. Such squares must be covered by friendly, or may be seized by hostile pieces. Hence it is manifest that Artillery must always have Infantry or Cavalry support, even in its own Line of Battle, to be protected.

119. This piece when free commands at a distance, and in spite of all intervening pieces may, without moving, put hostile ones of any order *hors de combat*, by removing them from such squares as come within its range. Its range or fire extends over 23 or 24 squares (see Figs. 10 and 11, Plate IV) according as it faces directly or obliquely on the board. These squares are *the ones whose centers are included within the arc described from the center of its own square with a radius equal to the diagonal of three squares*.

120. Artillery pieces may not be moved after having effected a capture (i. e., during the continuance of the current turn), nor may they effect more than one capture in a turn.*

121. Whenever Artillery comes within range of hostile Artillery, it must endeavor to overwhelm it by securing a preponderance of fire. In order to obtain this advantage, other Artillery pieces must be brought up, or else the pieces thus engaged simply neutralize each other's fire, and, so long as this neutralized state of affairs continues, neither of them may employ its fire against any other pieces upon the board. So soon, however, as either side succeeds in planting another battery against its opponent, and thus secures the preponderance, the *silenced* battery must retire, under penalty of being put *hors de combat* the next turn (if the opponent so desire), or else it must be similarly reënforced, and so on, until one side or the other secures the desired advantage. When this advantage has at length been obtained, the successful side thus regains so much of its artillery power as it can free, which may now be employed at will.

122. The Artillery piece may be *surrounded* by occupying its adjacent diagonal squares.†

123. It is to be noticed that, while two or more opposing but neutralized

* There is but one exception to this rule, to wit, where two or more *free* Artillery pieces cover *in potence* a hostile piece, the capture of the latter may be effected by them *in addition* to the single ordinary capture by each one in the same turn.

† And the Infantry piece by occupying the *contiguous* ones. But, of course, only general principles can be enunciated in such a ruling, since the circumstances of *action*, *neutralization*, *preponderance*, etc., enter the question so as to vary almost every application of the principle. See same subject as previously dealt with in reference to the Cavalry piece. ¶ 113.

Artillery, Infantry, and Engineer pieces thus draw each other's fire, the various squares, which they would otherwise cover, are no longer dangerous; also, that, if either party brings a piece of any *other* "arm" to bear upon the neutralized pieces, the latter are thereby endangered, and liable to be put *hors de combat* by such new piece; nevertheless, the power of a neutralized piece may not be thus regained; this can only be recovered by securing the preponderance, by means of other pieces of its own order, or by absolutely "taking" the opposing and neutralizing pieces with the aid of the other "arms," or, of course, by enemy's retiring, etc.

d. COLORS.

124. This piece consists of a $\frac{3}{4}$ inch square of pasteboard, and has the same Regular move as an Infantry piece, except that it may *never be moved in retreat*. (See Fig. 14, Plate II.)

125. Ordinarily a Standard must be *covered in potence* to be captured, but if drawn, or left beyond the cover of all friendly pieces, it may be taken from the board as an arbitrary forfeiture.

126. The square occupied by a Stand of Colors may be seized by hostile, if not held by friendly pieces, as the flags merely indicate positions along a Line of Battle. Such seizure, however, does *not* constitute a capture of the Colors unless they be covered in potence by free pieces. A free hostile piece holding such a square (i. e., occupying it with the Stand of Colors) may be regarded as covering the latter, but it will require the assistance of another free hostile piece, also covering it, to effect the removal of the Colors. A neutralized hostile piece so occupying it will *not* be regarded as covering the Colors, in so far as its capture is concerned. A similar ruling governs the case when such square is held by friendly pieces; these latter are regarded as defending the Colors and must first be neutralized, captured, etc., before the Colors can be regarded as threatened.

127. Standards and General Officers and Staff Department pieces, when these two latter orders are used in the Battle Game, must be distributed along the Line of Battle at the opening of the game, giving one of each to every brigade therein. The General Officers and Staff pieces may be in rear, but the Colors must be in the front line, and may occupy a square simultaneously with other line pieces, they not being regarded as played therewith, and being simply used to *indicate* the general line of battle. The flag squares

should be indicated at the beginning of a game by sketching temporary flags upon them, which will serve as landmarks, and thus lend valuable assistance in studying the changes which attend the fortunes of either side.

128. After the skirmish turns are over, the Colors must be moved forward with the general advance of each army, without any expenditure of points being necessary, and may never be more than one square behind its first general line, as decided at any time by the Referee. Each player must notice that the other lives up to this rule, challenging all violations thereof, a forfeiture of 10 points per standard being the penalty for neglecting it.

129. With every body of troops detached to create a diversion, a Stand of Colors shall be sent, it being moved arbitrarily therewith, and at no cost of points. A failure to send such a piece with the detached body shall entail a forfeiture of 10 points, the stand being thereafter located in its proper place with such detachment, and required to share its fortunes.

130. It is intended that the Colors shall advance so far as possible with their own brigades, and remain with them. They will not, therefore, be allowed to make use of the *Manœuvre move* simply with a view to avoiding *action*, etc., save at an expense of 10 points per square.

131. A single Standard is to be located on the center square of the *Baggage-park* at the opening of the game, from which it may not be moved. If this Standard be captured, the baggage falls into the enemy's hands, and he may replace such Standard by a spare one of his own color, replacing also at the same time the hostile Field-works by which it was protected, by Field-works of his own color. So long as either side maintains possession of the hostile baggage, the worsted side shall forfeit 2 pieces of baggage a turn.

Two or three extra stands of Colors may be located with the brigades of the reserve, and will be used to replace such as are lost in action, they being placed two squares in rear of the one from which a Standard has been captured, two deployment moves being allowed to make room for each one, if necessary. If such square be occupied by a hostile piece, the Colors must be placed upon the nearest vacant square, and, when there is a choice among such squares, it shall fall to the locating party.

132. Whenever a Stand of Colors is captured, the square from which it is removed will be temporarily designated by sketching thereon a flag in the color of the side effecting the capture.

133. The loss of a majority of its original number of Colors constitutes a defeat for the losing side.

134. Standards may only be captured at the opening of a turn, i. e., before any moves have been effected. Such captures will require no expenditures of points.

3. THE STAFF CORPS.

135. These constitute a most valuable element in the scientific and combatant part of an army. The Engineer, Ordnance, and perhaps the Cadet Corps may be regarded as coming under this head.*

a. ENGINEER PIECE.

136. The proportion of Engineers in an army is always small, but varies according to circumstances. In the Battle Game about one company may be attached to each division.

137. When desirable to employ this piece in the Battle Game, the one represented in Fig. 10, Plate II, will be employed. It is made of wood, silicated upon its top surface, and has a symbol [\times] on each end, to represent crossed hatchets.

138. Its Regular move is similar to that of the Infantry piece (see Fig. 2, Plate IV).

139. It puts hostile pieces *hors de combat* by displacement, moving one square in any direction for that purpose (see Fig. 12, Plate IV).

140. If threatened, it is subject to capture from any Line pieces that can cover it *in double potency*.

141. This piece possesses the following special power: It *controls*, to the prejudice of hostile Artillery and Field-works, all the squares which they mutually cover (see Fig. 13, Plate IV).

142. The Engineer piece can with impunity be advanced (not to exceed one regular move a turn) under the fire of a hostile work, and Infantry and

* Staff-corps pieces need not be employed in the Battle Game unless specially desired. Of course, every additional order of piece introduces a new element of complication, and it becomes more and more difficult to preserve proper relations upon the Game-board between the army as a whole and its *three arms* strictly, when such extra pieces are introduced. As a general rule, it will be best to play this game with pieces of the following orders only, to wit: Infantry, Cavalry, Artillery, Colors, Commander-in-chief, Baggage, and perhaps Engineers, and 4 pieces of Field-works. When, however, Staff-corps pieces, General Officers, Field-works, Topographical pieces, etc., are employed in the game, they will be subject to the rules and modifications hereinafter given.

Artillery pieces can, without further danger from such hostile pieces, follow up the movement, keeping upon the squares controlled by the Engineer piece, the advanced Engineer piece being regarded as having prepared the way, etc.

143. Its control over such squares as it can recover from the fire of hostile Artillery is lost if the opposing side secures the fire of at least two pieces in preponderance.

144. If two or more Engineer pieces be successfully established so as to command the square occupied by a hostile Field-work, the latter must be surrendered. It is thus clear that an Engineer piece can afford *cover* within the dangerous zone of Field-works and Artillery, advantage of which may be taken, by pieces of the other "arms" and by other Engineer pieces, to make *regular approaches* for the purpose of putting them *hors de combat* or of capturing them.

145. Two opposing Engineer pieces completely neutralize each other's power if within each other's range; otherwise they neutralize each other's power over such squares as they mutually cover, the law of preponderance obtaining *inter se* as in the case of Artillery.

b. ORDNANCE PIECE.

146. In the American Army the Ordnance Corps is usually non-combatant, but it may be and often is made to perform the duty of Artillery. In foreign services, Ordnance duty is that of the constructive and theoretical branch of the Artillery corps.

147. In Strategos this piece has given to it the Artillery move. (See Fig. 4, Plate IV.)

148. Whenever Ordnance pieces are employed, they must be made for the occasion out of the small slated Artillery pieces.

149. When employed as Artillery, this piece puts hostile pieces *hors de combat* as, moves as, and is subject to all the rules which govern, an Artillery piece (q. v.); otherwise it is regarded as a non-combatant Staff piece, and will be represented for the time being by proper symbols upon a slated disk.

c. CADET PIECE.

150. Cadets constitute a special corps in the United States and foreign services, and, though ordinarily regarded as non-combatant, may be called

upon to act as a corps in the capacity of either "arm," their permanent organization being that of Infantry.

151. In Strategos the Cadet piece has the same Regular move as Infantry, after the manner of which it also puts hostile pieces *hors de combat*.

152. When desirable to introduce this piece into a study, it should be improvised for the occasion out of one of the slated disks furnished in the outfit (symbol U. S. M. A.; see note to ¶ 135, and Appendix A).

4. THE GENERAL STAFF.

153. Comprehends all of the General Officers and their aids, and the Staff Departments and their employees. They are in general non-combatants.

154. When desirable to introduce these pieces into a game, the slated disks (Fig. 13, Plate II) should be employed and properly designated. (See Appendix A.)

a. GENERAL OFFICERS.

Commander-in-chief.

155. The Commander-in-chief, under the President, has in the United States service the rank of General, and in the Battle Game of Strategos has for its Regular move that of the Cavalry piece; it lacks, however, all the privileges of the Cavalry piece except the right to jump over friendly pieces of any order. It puts hostile pieces, except Artillery, Staff-corps pieces, and Field-works, *hors de combat* by displacement after the manner of a Cavalry piece.

156. The Commander-in-chief can not be captured, unless it is covered *in double potence*, and at the same time finds itself with no square on which to move which is not also already covered by hostile fire or occupied by hostile pieces. Even though the Commander-in-chief may effect a capture out of such a trap, it is still to be considered as a prisoner.

157. The Commander-in-chief may remain under fire if not covered by more than three pieces, but a forfeiture is incurred of 25 points for each time it is covered by hostile fire. When covered *in double potence*, it must *move* completely out of fire, otherwise it is a prisoner as above. When taken prisoner, one turn is forfeited, and the Commander-in-chief must be redeemed at an expense of 100 points, after the full payment of which, out of the regular and reserve counters, it may be replaced upon the board any-

where within its own lines and out of fire. The Commander-in-chief may never be moved or left within two squares of the advanced Line of Colors except at the risk of the player, as it then loses all of its immunity from capture, and may be put *hors de combat* by any free combatant piece that can cover it. When thus put *hors de combat*, it must be redeemed as above.

158. At the opening of the Game the Commander-in-chief, with a sufficient staff and body guard, is placed in some central position in rear of the second Line of Battle and midway between it and the reserve.

Generals.

159. When employed, these pieces will be made for the occasion out of the slated disks (Fig. 13, Plate II), and suitably designated. (See Appendix A.) Its Regular move is the same as that of the Cavalry piece. It puts hostile pieces *hors de combat* by displacement, making the Cavalry capture for that purpose ; it has, however, no power over Artillery, Staff-corps pieces, or Field-works. It must be covered *in potence* to be put *hors de combat*, but, if found more than two squares beyond the main Line of Battle, it loses its immunities, and may be seized as a prisoner of war by any hostile piece that can cover it, entailing a forfeiture of 50 points.

160. General officers effect their captures and cavalry movements by virtue of the mounted body guards by which they are usually surrounded. In actual warfare, though often forced to venture into extreme danger, they can generally escape capture by means of a bold dash. (*Vide* Colors, also note under head of Staff Corps.)

b. STAFF DEPARTMENTS.

161. These are all non-combatants, but are essential in some form or other to the very existence of a modern army. In the United States service they are as follows :

Adjutant-General's Dept.
Inspector-General's "
Quartermaster's "
Subsistence "
Medical "
Pay "
Bureau of Mil. Justice.
Signal Department.

Pieces belonging to these Departments have the same Regular move as a Cavalry piece. They will be constructed for the occasion out of the slated disks, the proper symbol being the letters, etc., belonging to their Department surrounded by a wreath. (See Appendix A.)

(See Table "b," Appendix G.)

162. As they are non-combatants, they have no power to effect captures. Such pieces, however, have great negative value, and should therefore be carefully protected.

163. The loss of one half of these pieces shall involve a forfeiture of 100 points.

164. When introduced into the Battle Game, they will be improvised out of the slated disks. (*Vide* Colors, also note under head of Staff Corps, ¶ 135.)

5. MISCELLANEOUS PIECES.

a. BAGGAGE, ETC.

165. A limited number of Baggage pieces, made of small, wooden, slated blocks, are furnished with the outfit for use in the Battle and Advanced Games. (Fig. 11, Plate II.)

Baggage columns should be properly itemized as to character, etc. (See Fig. 12, Plate VII, also ¶ 135.)

166. Baggage has always constituted an unavoidable impediment to armies, and yet one that for their safety has required the most careful protection. Its importance in the Battle Game of Strategos is of a negative character.

167. The Baggage piece has the same Regular move as the Artillery piece, and when not in Park must keep upon the *line of communication*, this being the belt of squares three inches wide containing the flag square of the Park, and running perpendicular to the Line of Battle. The line of communication may also be arbitrarily indicated upon the slated board before commencing the game.

168. Any piece of Baggage found out of the Park and off the line of communication has to be abandoned, and may be put off the board arbitrarily by the opposite side.

169. The Baggage piece has no power to put hostile pieces *hors de combat*, and may itself be so put by any piece, except Baggage, that can cover it. (See Colors.)

170. The loss of all the Baggage shall constitute a defeat.

b. INTRENCHMENTS,* ETC.

171. When regarded as simple intrenchments, such as are rapidly thrown up anywhere upon a Battle-field, these pieces may be either located at the opening of the Game, or else thrown *into position* afterward with the assistance of Engineer pieces. To accomplish this latter object, an Engineer piece is to be placed upon a square diagonally adjacent to the Intrenchment piece; the latter may then be jumped over the Engineer piece to the square diagonally in front of it, and so on, each jump costing 15 points. The Intrenchment must be thrown up, i. e., placed in the desired position in four *turns* after having been first touched, and may not thereafter be moved, and until so thrown up can have no offensive power.

172. The Intrenchment piece can not take advantage of the Manœuvre move, and, when not located at the opening of the game, must be placed with the Reserve or Baggage Park, as Engineer *material*, etc.

173. Field-works or Intrenchments put hostile pieces *hors de combat* without moving, they being supposed to be garnished with Infantry and Artillery. In addition to the range of Artillery, this piece commands all the adjacent squares (34 or 33) in its proper front and flanks (see Figs. 14 and 15, Plate IV), and upon all sides, in this case 60 squares, if regarded as an *inclosed work*.

174. Its maximum number of captures in one turn is 2.

175. The Field-work may be *silenced* by overwhelming it with Artillery, which will require the simultaneous (i. e., in the same *turn*) establishment of three Artillery pieces against it. With the assistance of an Engineer piece, it may be silenced by two Artillery pieces pushed up so as to command it from within two squares of the one it occupies, these Artillery pieces being protected by the controlling power of the Engineer piece. When thus silenced, Field-works, etc., lose all offensive power, and may be put completely *hors de combat* by bringing an additional Artillery piece to bear upon them. But, if it be desired simply to capture them for one's own use, they may, when silenced, be taken by Infantry (or by Cavalry, if accessible, in reverse). When so captured, they are to be crowned by an extra Intrenchment piece of the capturing side, and may now be maintained against their

* The one-inch square slated Tactical and Topographical pieces may be employed to represent Intrenchments, etc. In such case they will be suitably delineated. When located *permanently*, a symbol may be sketched (Fig. 14, Plate VII) upon the board itself to represent this piece.

original owners. They may also be captured by Engineer pieces alone (see Engineer piece). Ordinarily these pieces will not enter into the Battle Game, with the exception of four of them, which will be habitually located with the Baggage occupying the angles of the Park, from which positions they may not be moved. (See note under head of Staff Corps.)

CHAPTER III.

SPECIAL RULES FOR THE CONDUCT OF THE BATTLE GAME.

176. ESTIMATING a single turn as representing 5 minutes of actual time, the maximum distance in squares, to which pieces of the several "arms" may be moved in one such turn, will be as follows :

CHARACTER OF "ARMS."	Directly.	Obliquely.	Average, i. e., partly <i>oblique</i> and partly <i>di-rect</i> .
Infantry.....	4	3	3
Artillery.....	6	4	5
Cavalry.....	7	5	6
All arms.....	6	4	5

The number of squares thus allowed the various "arms" upon the board are very nearly proportional to the distances in yards which could be passed over in 5 minutes by Infantry at its best average rates, and by Artillery or Cavalry at a trot, or by all "arms" combined at forced rates. (See Table F, Advanced Game.)

In general, about 5 squares obliquely to 7 directly will govern estimates of distance upon the board.

177. A *change of front* is to be regarded as a move, in so far as its effect upon the cost of future captures is concerned.

178. The jump made by the Field-work when being *engineered* to a new position, i. e., *thrown up*, is to be regarded as a move, in so far as its effect upon the power to make subsequent captures is concerned.

179. If during a turn the finger be removed from a piece, the points shall be counted, and such move can not be taken back save by the expenditure of additional points, and as subjected to ruling in ¶ 184.

180. All squares that are within the zone of fire of hostile pieces, whether such pieces be neutralized or not, are supposed to be *covered* to such an extent as to necessitate any piece of the opposing side to make a Regular move in passing over such squares.

181. Whenever it is desirable to move a neutralized piece, it will require *double* the ordinary expenditure of points as for such pieces when simply in action and free.

182. Whenever it is desirable to move Artillery, Infantry, or Engineer pieces that are under a preponderance of fire, it will require *double* the expenditure of points that are necessary to move such pieces when simply neutralized.

183. If a free piece be threatened in *potence* by pieces of a different "arm," its movement may only be effected at a *double* expenditure of points. If such a piece be covered in *double potence*, its movements may only be effected by the same expenditure of points as though it were overwhelmed.

184. FALSE MOVES.—Should a player during his turn make a *false move*, or a mistake in the calculation of points expended, his opponent may call *points* upon him so soon as he shall have raised his fingers from the piece under consideration. If the move shall then be found to have been an impossible one, the piece must be returned to its original square, and an arbitrary forfeiture of 5 points incurred. Should, however, the move have been possible, but simply under-estimated, a correction of the number of points to be actually recorded must be made, even though the required number has to be drawn from the reserve or the succeeding counter.

185. Cavalry can not be neutralized by any "arm."

186. Pieces of different orders may threaten, but can not neutralize each other. Thus Infantry can not neutralize Artillery, or *vice versa*; but either, of course, may threaten the other. (See ¶¶ 57 and 183.)

187. A piece that has effected a capture will not be allowed to have any weight in questions of preponderance or neutralization during the current play of the party so effecting it.

188. In studying questions of neutralization, preference should always be given where possible to fire which is *directly with the squares*.

189. A piece may exercise its power to neutralize only toward its *actual front*, that is, by direct fire.

190. Hence, if not already facing in the proper direction to *return* the direct fire of a threatening piece, a piece must effect a *change of front* for that purpose, or be regarded as overwhelmed, i. e., subjected to *oblique* or *enfilade* fire.

191. As a general rule, pieces will neutralize the *nearest* hostile ones of their own order that are within range. In moving into action they will necessarily take up the proper direction so as to gain direct fire upon their opponents. The pieces thus neutralized, if not already facing in the proper direction to return direct fire, must now change front to do so, or be regarded as overwhelmed.

192. In cases where a piece is thus *forced* to change front, a due expenditure of points must be made therefor. If the piece was not previously in action, a forced change of front will cost 1 point, if such change be not more than 90° , and 2 points, if it be to its rear. If the neutralized pieces shall have been previously in action, the cost of a Regular move, etc., will govern the case.

193. Pieces moving *into* action do not necessarily *alter* neutralization which already exists, though it may be allowed. When, however, such pieces come to the support of others, and an equalization of strength, or a preponderance, is thereby gained, the neutralization should usually be *diversified* so as to bring as many pieces into operation upon each side as are demanded by the circumstances of the case. The simple possession, however, of a preponderance will not carry with it the right to diversify the neutralization at will ; but all such exercise of preponderating power must follow the general rules of experience, which go to show that, while Artillery fire can generally be directed upon the field, that of Infantry is usually beyond control, answers the nearest foe, as a rule, and, other things being equal, fires normal to its immediate front.

194. From similar considerations to the above, pieces moving *out* of action will generally *free those that they formerly neutralized*, and no others.

195. In all cases of continued dispute about preponderance and neutralization, the case may be settled by giving a preference to the direct fire of all the pieces concerned, commencing from the right flank of the player, indicated by the toss of a counter (head or tail). The mutually opposite pieces having thus been neutralized, it shall be the privilege of the *playing*

side to utilize his remaining free pieces at his own option, subject, however, to ¶¶ 188, 189, 190.*

196. While the Game is in progress, pieces which mutually control or neutralize each other will be turned *upon their sides*, their tops being faced toward each other. Preponderating and otherwise free pieces will be left naturally (i. e., *top up*). Capturable ones may be stood *on end*; and pieces which have effected a capture during the current turn are to be turned *bottom up*. (N. B. The pieces and Game-board being slated, this feature may be utilized to indicate the front, flanks, direction of fire, neutralization, etc., in doubtful or complicated cases.)

197. A simple means of determining whether the neutralization is correct is to count the number of pieces of the same order that are turned upon their sides. This number should generally be equal for *blue* and *red*. There are, however, exceptions to this rule, as when an Infantry piece facing to the flank or reverse of an opposing one secures a fire upon it without the latter having any *return*. In such cases the latter piece is to be turned upon its side, as neutralized, while the former remains top up, and, though in action, is free, and has the preponderance. (See ¶ 196.)

198. A piece will generally be found to indicate its own *front*, *flanks*, and

* To assist the student somewhat in fixing the principles of neutralization, preponderance, etc., in his mind, Figs. 16 to 25, Plate IV, are introduced, and may be briefly explained as follows:

Fig. 16 shows two sets that are *out of action*, or *free*.

Fig. 17. All have entered action, except *a*; they are therefore *neutralized* two and two.

In Fig. 18 *a* has moved to *a'*, thereby *neutralizing* *b*, which is thus forced to *change front*, thus relieving *a'*, which now *preponderates* upon *b* and *b'*. This figure shows the truthfulness of the Game in representing what actually takes place upon the field, since such an attack by *a* to *a'* would naturally outflank and turn the hostile line at *b*, and enable *a'* to pour in a deadly preponderance *at the elbow*. Had *a*, as in Fig. 19, moved to the rear of *b*, it would take part of that line in *reverse*, force similar changes of front, and leave *a'* preponderating as before, only with greater advantage.

Fig. 20 shows the condition of neutralization after *b* (attacked as in Fig. 19) has effected a retreat.

In Fig. 21 all the pieces are *in action* except *b*; *a*, though *in action*, is *free*, and preponderates over all the pieces within its range.

Fig. 22 shows the state of the case after *b* has moved up to *b'*, thus *neutralizing* *a*, and making the present state of neutralization general.

In Fig. 23 *b* moves to *b''*, neutralizes *a*, and forces it to change front to *return* the neutralization.

In Fig. 24 *b* moves to *b'''*, and neutralizes *a*; *b'* moves to *b''*, and gains a preponderance over *a*. In this case, however, *a'* gains a preponderance over *b'''*, which can only be neutralized by moving the remaining pieces of *A* into action.

Fig. 25 represents all the pieces in mutual action and neutralization, except *b''*, which is *free*, and preponderates.

A vast number of similar problems will arise in the course of every Game, which must be studied according to the general principles already enunciated.

rear by its position, and the disposition of adjacent pieces. Its power and fire will generally depend upon the direction in which it thus faces (see Plate IV). Should it be desirable at any time to change front with this or that piece, such a manœuvre may be effected by simply turning it to face in the desired direction. Such a change of front will cost 1 point per quarter turn if the piece be out of action, or the equivalent of the Regular move for each quarter turn if the piece be in action.* It should be noticed (Figs. 6, 11, 15, Plate IV) that Infantry and Artillery pieces in changing front lose fire upon certain squares and gain it upon new ones.

199. A piece moving on a square which is not under fire may take up a position so as to face in any direction, every change of front thereby involved being regarded as comprehended in the movement. In such cases its new front will indicate the direction in which its power to neutralize may be exercised without any further change of front being necessary.

* A *complete* change of front, as by a wheel about by fours, etc., will be made at the cost of a Manœuvre or Regular move to the rear, according as the piece so effecting it is out of or under fire.

CHAPTER IV.

METHOD OF PLAYING THE BATTLE GAME.

200. Two players having agreed upon all the necessary preliminaries, such as the character of the battle to be fought, the number of troops of each "arm" to be allowed,* whether or not a standard authority is to be followed in the arrangements, etc., the Game will be played as follows :

1. DISPOSITIONS.

201. These will generally be made *behind a screen*. The Game-board, placed upon a suitable table, should have its longest dimensions extending to the sides of the players, and the screen be raised along the central line of the middle ground.

202. The dispositions are next to be made by each player in his own territory, and will conform to the principles laid down in the foregoing discussions, and to other sound military considerations (see Plate III). Any clearly unmilitary arrangement, as, for instance, such a one as would be impossible or decidedly improbable upon the field, whether as to strength, distance, or arrangement, is subject to challenge, and, if not satisfactorily defended or altered, may be finally referred to an arbiter.†

2. RECONNOITERING.

203. This is effected by removing the screen from 1 to 5 minutes by the watch, during which time the players may study each other's dispositions,

* See Appendix B, where an equation will be found for proportioning "the Three Arms" among any number of men. Also see Appendix C, where the standard American Army Corps will be found properly *organized* into its several subdivisions, as an example to be followed or modified according to sound military principles.

† The screen may be dispensed with on agreement.

When some special battle plan is to be studied, as, for instance, when Dufour's "Offensive and Defensive Dispositions" of the same-sized army are to be tested as against each other, the screen will be omitted, and the text-book, etc., followed.

and challenge them, if not in conformity with the spirit of well-known military principles. If no challenge be made, the screen will be replaced at the expiration of the above interval of time.

3. REARRANGEMENT.

204. Each player may now make such changes in his dispositions as the reconnaissance may have suggested, and as can be effected by the expenditure of 10 counters, or 500 points. These changes will be made in turn under the eye of a Referee, if one has been chosen, and where a challenged disposition has been ordered to be changed will be expended in effecting such change as far as possible. If no challenge has been given, they may be expended at will.*

4. THE ADVANCE INTO FIRE.

205. The screen is now taken down and laid aside. The initiative belongs to the party acting upon the offensive; otherwise it will be decided by the dice, or lot.

206. The player having the initiative places two counters in reserve and, taking a third, expends it in *moves*.

207. The counter being exhausted, and the player not wishing to use a reserve counter, his turn is ended.

208. The opponent now makes a similar play, and so the game continues until a turn is completed which leaves at least five pieces, all belonging to the same side, within range of hostile pieces.

209. *Up to this time no captures can be made by either side.*

5. SKIRMISHING.

210. A series of short turns now begins. These are called Skirmishing turns, 25 to 50 being allowed to each side. They are each limited to a single move, either Regular or Manœuvre, or to a single capture, and are to be strictly alternate.†

* The reconnaissance and rearrangement will be omitted if no screen has been employed.

If a text-book, as, for instance, "Dufour," has been followed as a guide in the arrangement, etc., the Game should be played so long as possible in the exact order therein laid down, i. e., the *defensive army* will be properly drawn up in its general arrangement; the *attacking army* is then placed in the order in which it would open the attack; the proper additional defensive dispositions are then made, as laid down, and so on, until all the additional steps and counter steps have been taken.

† The following variation for playing the Skirmish turns may be found interesting. The player

211. But 1 minute is allowed for each Skirmish turn, and the first one shall belong to the side having the largest number of its own pieces covering hostile ones. Should neither side preponderate in this particular, it will belong to the side which would naturally play next. On previous agreement, however, it may be decided by lot. During the skirmishing, reserve counters may be expended, but in moves only.

6. GENERAL ENGAGEMENT.

212. Skirmishing having terminated, the general action comes on ; the player whose Skirmish turns are first exhausted playing the first succeeding regular turn, i. e., expending one regular counter, and one or two reserve counters if desired. The opponent follows in due turn, and so they continue, playing alternately, until the game is terminated.

7. THE VICTORY.

213. The Battle Game of "Strategos" is intended to give practice in organizing armies, making dispositions, and in forming lines and orders of battle ; to familiarize the player with the natural run of affairs during action ; to sharpen the *coup d'œil* ; to fix in the mind the individuality of each of "the Three Arms," their relative importance, and the necessity of their combined use ; to suggest practical and decisive concentrations at opportune moments ; to afford field and opportunity for comprehensive battle plans, and, in a word, to inculcate *generalship*. It is gotten up essentially to assist theoretical study, and will have amply realized its object if it approximately accomplish the above good intentions.

214. It is preferable to leave the awarding of victory in a game of this nature to the sound sense of the players themselves. However—to make but two rulings on this point—the Game, *as a mere game*, may be regarded as an effort upon the part of both players to capture the hostile Baggage or a majority of the hostile Colors.

The accomplishment of either of these objects will secure the victory for the player effecting it.

entitled to the first Skirmish turn makes a capture or a Regular or Manœuvre move, accordingly as he elects ; his opponent keeps record of the number of points such a move or capture requires, and is entitled to expend that number of points in *retaliation* before he makes his own Skirmish play, the value of which latter play in points his opponent may in due turn expend, before making his own, and so on for each player, until all such turns are finished.

215. These two rulings are, in fact, made with a view to *indicating* a defeat, as by a turning movement, or superior concentration, or some strategic demonstration against communications, and are considered to be as little arbitrary as any others that could have been selected.

8. FINAL DISPOSITIONS.

216. At the close of a game the board will generally be pretty well stripped of men. In order, therefore, to produce a better resemblance to the theoretical result of the study, each side will be allowed to replace upon the board a certain quota of the pieces that have been put *hors de combat*, the victorious side replacing $\frac{1}{2}$, and the defeated side $\frac{1}{10}$.*

These pieces will be arranged along the whole extent of the general Lines of Battle, as indicated by the pieces already on the board, the victorious army, in reorganizing, being allowed to move up (directly forward) its straggling pieces, so as to secure as military and strategical a disposition as possible, after which the pieces of the defeated army will be moved backward along the line, so as to leave one line of squares between the two armies wholly unoccupied.

The rest of the captured pieces may now be replaced upon the board *bottom up*, and strewn indiscriminately along the original Lines of Battle and along the general advance of each army. The general run of the Game may then be recalled, its military semblances referred to, the comparative positions of the two armies at the beginning and termination studied, and the Game formally closed.†

* Before, however, this is done, the losses should of course be examined, and pieces paired off.

† Where parties of two or three upon each side play this Battle Game, and act as sub-commanders under one, who simply gives general orders as to what is to be done, the personality, leadership, and ability to supplement and cooperate are brought out in a marked degree, and the utmost interest will result from playing such a game, both to lookers-on and to those engaged, provided the players themselves are *thoroughly familiar with the rules of the Game*. In this case the number of points to be expended by each player upon a side may either be fixed arbitrarily, or ordered at the time by the chief, or decided by a die, the 50 points of a counter being divided proportionally among the players according to their throws, or else each spot calling for a corresponding point, etc.

Such a game was played by the Committee of six Officers (three on a side) requested to examine the Game at West Point, N. Y.

An interesting change in the general method of playing the Game is as follows: Let the moves, captures, etc., be strictly alternate, as in chess, record being kept of all the points which are required to make the several alternate plays. The Game thus becomes slower, but the influence of *action*, *preponderance*, *neutralization*, etc., comes out more boldly; the power to move, concentrate, and dispose troops being, however, proportionally curtailed. The comparison of the number of points expended

NOTES IN RECAPITULATION OF BATTLE GAME.

Forfeitures.

Turn waived.....	Counter forfeited to opponent who can put his own in reserve.
Points unexpended when time is called.....	Forfeited to opponent.
False moves	5 points forfeited, piece to be returned to original square.
Loss of Commander-in-chief..	100 points forfeited.
“ of a General.....	50 “ “
“ of $\frac{1}{2}$ of Staff pieces.....	100 “ “
“ of Park Colors.....	2 pieces of baggage forfeited per turn.
Colors not upon line.....	10 points per turn forfeited.
“ “ with detached party (diversion).....	10 points per turn forfeited.
Baggage off the line of communications.....	Forfeited.
Detachment reduced below minimum strength....	25 points per turn, until, etc.
Artillery left beyond support.	“ “
Commander-in-chief threatened.....	25 points per threatening piece.
Played pieces threatened at opening of a turn.....	Top (i. e., extra) piece forfeited.

in such a game will give a rude idea of the relative amount of work undertaken, and the force expended upon it.

A Battle Game may be played upon the principle of a grand game of chess, and subject to all the rules of ordinary chess, in which case the following values may be assigned to the various pieces :

Baggage Colors	= Kings.
Commanders-in-chief and Generals	= Queens.
Infantry and Colors	= Pawns.
Artillery and Field-works	= Castles.
Cavalry and Staff	= Knights.
Staff Corps	= Bishops.

The baggage is to be located, and have no power to move except *one square* at a time along line of communications. The dispositions, reconnoitering, rearranging, etc., will follow the same general principles as in the regular game. In this case a counter of 50 *points* will be played per turn, *each point* corresponding to a capture, or to the movement of any piece one square. The object of the game will be to *capture the baggage*, which will be accomplished so soon as the baggage colors are *checked*.

Expenditure of Points necessary for Various Purposes.

MOVES.

Manceuvre move	Forward or sideway, 1 point.
“ “	Backward (i. e., in retreat), 2 points.
“ “	Colors sideway 10 “
“ “	“ forward, 0 point.
“ “	“ backward, <i>may not move</i> .
Regular moves.....	Inf'y, forward or sideway, per square, 3 points.
“ “	“ backward, “ 6 “
“ “	Cav., for'd, back'd, or sideway, “ 2 “
“ “	Artillery, forward, “ 5 “
“ “	“ backward, “ 10 “
Changes of front—if not in action.....	1 point per $\frac{1}{4}$ change.
Changes of front—if in action.	At the cost of the Reg. move for $\frac{1}{4}$ change.
“ “ “ “ .	A change <i>to the rear</i> ; <i>double</i> the cost of a Regular move.
Neutralized Pieces.....	Move at <i>double</i> the cost of Regular move.
Overwhelmed or Preponder- ated Pieces.....	Move at <i>double</i> the cost for neutralized pieces.

CAPTURES.

If no piece has been moved...	5 points each.
If moves have been made....	20 “ “
If capturing piece has been moved	40 “ “
Arbitrary captures.....	0 point “
Capture of colors*.....	0 “ “
Throwing up intrenchments..	15 points per jump.
For Moves of the various pieces, see Plate IV and Chapter II.	
“ Powers, etc., “ “ “ “	IV.
“ Order of Procedure of Game, “	Chapter IV, ¶ 200, <i>et seq.</i>
“ “ “ of a turn, “	I, ¶ 80, <i>et seq.</i>
“ “ “ for expending a counter, see	Chapter I, ¶ 83.
“ Rules governing general and special cases, see	Text.

* Can only be effected at opening of a turn, before any moves have been made, and when they are duly covered.

CHAPTER V.

TOPOGRAPHY INTRODUCED INTO THE BATTLE GAME.

217. By the introduction of topographical and strategical pieces and conditions, the Battle Game will of course be correspondingly complicated ; nevertheless, the addition may be attempted after one becomes familiar with the Game in its simplest form. The Battle Game can thus be made to approximate more and more to the conditions of actual warfare. The players themselves must agree together to assign proper importance to such pieces and dispositions according to sound military principles. Here, again, no arbitrary rules are even attempted, but the whole field left open to the discussion, study, and final decision of the players, should their interest lead them to it.

218. For instance (Fig. 6, Plate I) : Suppose an army be drawn up, defensively, its right flank resting upon a village held in force, its left upon a forest or swamp, while its center holds as a key-point certain commanding heights. Then it should be agreed beforehand, in deference to the principles of the science of war, and the rarely alterable facts of such existing circumstances, that the Cavalry can not attack the heights, at any rate, without great disadvantage, and more often not at all ; moreover, that it can not cross the swamp nor presume to carry the woods. The Artillery can still less cross the swamp, and, while it may be employed with effect against troops in the village, it may seldom be used to advantage in blindly shelling the woods (see § 1,213 Light Art. Tactics), and can not venture to enter them in the face of hostile troops. Hence, upon the Infantry in particular must devolve the difficult task of carrying the key positions so held, assisted perhaps in the preparatory movements by Artillery, and in the subsequent ones by the Cavalry Arm. Moreover, that important moral increment to the strength of troops, derived from the consciousness of occu-

pying commanding heights and strong positions, should be recognized in some marked way, as by making it necessary for the attacking force to *double* every Infantry piece advanced against such positions, attacking *double* pieces being regarded as merely equivalent to defending *single* ones.

219. Again, an army attacking another, awaiting it in such a strong position, should be allowed that considerable preponderance in strength (i. e., in numbers or points) without which in actual warfare an offensive movement against such a position would rarely ever be attempted. Nevertheless, even as Hannibal crossed the Clusian swamps, and Marlborough at Blenheim sent his Cavalry across the Nebel with its marshy borders, and Frederick's troops at Prague stayed not for its deep and muddy meadows, so, too, upon the Game-board, our rules must not be so rigid as to find no exceptions. It must always be borne in mind that the very exceptions to the rules of war constitute in themselves a science by no means inconsiderable.

220. It is likewise to be noticed that, as the Game-board itself is simply a large slate, rude topographical features may be sketched thereon, and the confusion of so many additional pieces thus avoided. This method is greatly preferable to using the Topographical blocks in the Battle Game, the proper use of these blocks being more strictly that of ready illustration in reading and studying text-books on Strategy and Grand Tactics (see ¶ 11, etc.). Historical campaigns and battles may in similar manner be studied in detail by sketching the theatre upon the board, and following the movements as already suggested (¶ 20, etc.), and as will be more fully understood after reading the explanation of the Advanced Game.

THE ADVANCED GAME

FOR STUDYING IDEAL BATTLES AND CAMPAIGNS

UPON THE MAP.

THE ADVANCED GAME.

INTRODUCTION.

221. WITH regard to the proper distribution of troops, so as to accommodate the "the Three Arms" to the requirements of strategic and topographical considerations, a most interesting investigation will result from the study of some special case. For instance, one's own neighborhood may be hastily sketched in large scale (5 to 10 inches to the mile) upon the slated board. This may be done from regular military notes made upon the ground, or from accurate county maps, where such are within reach.

222. An army may now be drawn up defensively thereon, and another be placed *en route* upon the roads to attack it. The dispositions, distances, forces occupying the various points, their mutual relations and support, etc., should all be subjected to the most searching military scrutiny, and made to conform absolutely to the very best information possessed and attainable.

223. The careful discussion of the distributions and arrangements of both armies, the subsequent movements, both in the attack and defense, and their relative importance in case of either success or failure or both, will open a theatre of study as comprehensive as it would be beneficial to any military student.

224. Should it be desirable to carry out this latter suggestion to its full and legitimate consummation, as may easily be done at a large military

post, or with a class, sides may be chosen, and several officers and students take part in such a study.

225. On either side special Staff positions may be assigned, each player being responsible for the proper realization of so much of the plan as naturally falls to his position. He must study the special circumstances, make out the necessary orders, memoranda, etc., with a view both to success and failure, and be prepared to defend and elucidate his arrangements upon accurate military principles.

226. It is here in particular that it is desirable to impress upon American soldiers the supreme importance of these preliminary steps, which alone can make the Advanced Game beneficial. These steps cover the broad subject of *details*, involve the most careful calculation and study, and should be undertaken as *faithfully and as minutely as though they were to be put in actual operation*. It is absurd to attempt to "fight a corps," and remain in ignorance of the essential elements of its existence. Transportation, Subsistence, Organization, Administration, etc., therefore come into the problem at the very outset, and, until players are familiar with all that can be systematized upon these subjects, they should forego the study of what may be accomplished with such a body by one who is familiar with these details, for ignorance of them can lead only to disaster.

227. The players upon each side may choose their chief, unless already designated by rank and experience, and in *council of war* may advise and deliberate, subject to all the proper rules and restrictions governing an actual deliberation of such a character.

228. The Battle or Campaign may now be actually fought; its progress, rates of casualty, changing phases, and general march toward victory and defeat conforming to all that can be learned and brought to bear upon such a study. The arbitrary assignments of values and moves are here entirely out of the question and improper. The whole study must base itself upon actualities, upon careful investigations, and upon the tabulated results of former battles and campaigns.

229. Such a study is entirely feasible in our day. The records of the War Department concerning these matters, derived from the sore experience of the great War of the Rebellion, are already very generally tabulated and published, tables of fire are within reach of military men, and no elements are wanting to make this advanced employment of the Strategos outfit as

instructive to the American military student as the game of Kriegsspiel can be to the Prussian, or its English translation to the British soldier.*

230. In calculating the rate of *casualties* in battle, varied as these would be on account of continually altering circumstances (troops being sometimes holding positions, at others advancing to attack; now in intrenchments, and then in retreat; at one time under Infantry fire, and at another under the varying fire of Artillery), various suitable tables must be formed and consulted. (See Appendix F.)

231. The element of *distance*, as actually represented in proper scale upon the topographical site under consideration, and the no less important element of *time*, must come into the general determination of the effectiveness of the distributions and concentrations, and of the offensive and defensive manœuvres made by both sides, arbitration being resorted to when other means fail.

Victory and defeat, their chances and their consequences, must be decided upon similar military principles.

232. Finally, the Game may terminate in a general debate and open discussion of the points brought out, both sides taking part; the summing-up being given to the chiefs, and the Referee closing with a brief *résumé* of the whole game and its noticeable points of military interest.

233. A study of such breadth may well occupy a whole winter, be replete with information and valuable facts, and would certainly possess all the elements of interest desirable in studies *preparatory to war*.

234. Whether it be limited to the study of a single battle, or extended to the more general considerations of a whole campaign, such an application of the outfit will require a most extensive knowledge of the Military Art, Science, and History, *and a more than passing object in the study of these matters*.

235. This information and interest can hardly be expected outside the ranks of professional military men, to whom it is recommended for such further development as their studies may lead them to bestow upon it, reference being had to the following pages and to the tables and instructions given in the Appendices.†

* See Appendices E, F, and G.

† STANDARD AUTHORITIES, ETC.—It is, of course, far beyond our power to give more than a very brief and incomplete catalogue of works which the student of the Advanced Game may peruse with

benefit. Besides, however, those that have from time to time in the course of the text been already referred to, the following are recommended: *Army Organization and Administration, etc.*: "United States Army Regulations"; Sir Garnet Wolseley's "Soldier's Pocket-book"; "The Armies of Europe," McClellan; Green's "Report on the Turko-Russian War"; "Armies of Asia and Europe," Upton; "The Autumn Manœuvres of England," Captain C. B. Brackenbury, R. A., London, 1872; "Regulations for the Training of Troops for Service in the Field, and for the Conduct of Peace Manœuvres," translated from German by Lieutenant E. Baring, R. A., London, 1871; Baron Stoffel's "Reports on the Military Forces of Prussia, addressed to the French Minister of War"; "Compendium of General Orders," 1861-'65, published by the War Department; Report on the "Organizations and Campaigns of the Army of the Potomac," 1864, McClellan; etc.

Transportation, Equipment, and Movement of Troops.—"The March of an Army Corps," London, 1873, pamphlet; "Studies in Troop-heading," I, II, III, and IV Parts; "Ordnance Notes," 107, 119, 121, etc.; "United States Regulations and General Orders," Tactics, Manuals, etc.

Baggage, Trains, Subsistence, etc.—See "Quartermaster's Manual"; "Ordnance Manual"; "Engineer's Manuals"; "United States Signal Manual"; "United States Regulations, General Orders," etc.; "Military Train Manual," London, 1862, pamphlet, etc.; "General Order 86, series of 1877"; "General Order 59, series of 1878"; "Ordnance Notes," No. 107.

Sieges, etc.—"The Annals of a Fortress," by Colonel Violet le Duc; "Siege Artillery in the Campaigns against Richmond," Abbot; "Siege and Reduction of Fort Pulaski," Gillmore; "Report on Defenses of Washington," Barnard.

For Military Statistics of all the first-class Powers of the world, see yearly "Almanack de Gotha." For rates of casualty from sickness, battle, etc., arranged as to time of year, section of the country, etc., see Part I, Medical Vol., and Appendix of "Medical and Surgical History of the War of the Rebellion." For rates of fire, accuracy, projectiles, and general military topics, see Reports of Chief of Ordnance; files of "Ordnance Notes"; Professional Papers of the Engineer Department; "Proceedings of the United Service Institution" (English); and of the "Military Service Institution" (American).

CHAPTER I.

MAPS, SCALES, AND MILITARY PIECES.

1. MAPS AND SCALES.

a. MAPS.

236. The maps used in the Advanced Game should, if possible, be drawn to a scale of 5 or 10 inches to a mile, or some multiple thereof. Such scales will best suit the requirements of the military pieces furnished with the outfit. Scales, however, from 4 to 6 inches, and from 8 to 12 inches to a mile, and their multiples, will satisfy the requirements with sufficient accuracy for all ordinary purposes. Maps of townships, counties, etc., within these wide limits, can be procured quite generally throughout the country.

237. The student can accommodate himself to maps at hand in numberless ways. For instance, the purposes of the Game will be fully subserved by *assuming* any conveniently large-scaled map as being at a 5- or 10-inch scale; thus, in a trial game at West Point, New York, a 6"-map was arbitrarily taken as at a 10"-scale. Distances were measured thereon and ranges estimated, exactly as though the map was at this latter scale. In this connection it should be noticed, too, that when a game is played upon a map at 250 yards to the inch (7.04" per mile, or $\frac{1}{4}$ th—Continental system) the several pieces will be at about their average "effective strength" on the war footing (710 men per regiment; see Appendix E, Table "f"). In this case, if the map scale is to be retained, for the sake of the latter consideration, the casualties due to Infantry fire must be affected with a *multiplier* of $\frac{7}{10}$ ths on the score of *firing unit*. (See Case 54, Table R.)

238. The very best map upon which to conduct a Siege Game may be readily constructed by enlarging to a 10" scale the plan of the site chosen by Violet le Duc in his admirable book, "The Annals of a Fortress." A

deliberate study thereon of the various methods of attack and defense will cover most every case of interest.

239. The Pantograph will be found convenient for enlarging and reducing maps, when necessary. It can be obtained of any large instrument maker at moderate cost.*

b. SLOPE OF GROUND, "CONTOUR SCALES."

240. When the maps employed give contour lines, the influence of slopes upon the movements of troops may be introduced into the Advanced Game. The slope of the ground at any point represented upon a contoured map may be estimated by the amount of interval between the several consecutive contour lines at or near that point.

Let A C (Plate V, Fig. 1) be perpendicular to A D, and through the point A let lines be drawn making angles of 5° , 10° , 15° , etc., with A D; then, to read the slopes from the contour intervals, we have the following:

Rule I.—From the point A and upon the line A C lay off a distance

* On account of the great expense that would attend such a special publication, no regular maps are furnished with the Strategos outfit. Military maps must therefore be improvised, when none are within reach, as a part of the study of the Game. Large sheets of cartridge paper or wide rolls of unbleached cloth, upon which the topography is rudely put in with colors, answer admirably for the purpose of the Game, and the larger the scale employed, the better.

The maps employed in England are those of the Ordnance Survey, 6" to the mile: a set of 15 of these maps, carefully selected, colored, and mounted, can be procured of Henry S. King & Co., 65 Cornhill, London, for £6. The maps used in Prussia are drawn to a scale of 8 inches to the mile, and, though rough of execution, are well suited to the purposes of the war game. The "Plan" of the "Allied Positions before Sebastopol," by the English engineers, size 6×9 feet, scale 6 inches to the mile, is well suited for historical and theoretical study.

In Van Nostrand's "Engineering Magazine" for June, 1879, page 472, will be found a brief summary of all the manipulations requisite in the very simple "blue process of copying tracings." This method is recommended for use in duplicating maps for the Game. (See Appendix H.)

At Forts Hamilton and Columbus, New York Harbor, the Advanced Game is played upon raised maps or models made out of plaster of Paris. Upon them little villages, woods, fences, etc., are all represented in an ingenious way, and the whole being colored in the military topographical symbolism, games played thereon become realistic to a high degree. Such models can very readily be constructed, should have the same vertical and horizontal scale, and will be most convenient if so constructed as to separate into several sections of a size suitable for packing or storing when not in use.

Text-books and Authorities.—"Military Drawing and Surveying," Captain William Patterson: London, 1862. "Topographical Drawing," Smith: A. S. Barnes, New York. "Elementary Military Geography, Reconnoitering, and Sketching," Lieutenant C. E. H. Vincent: London, 1873. "Notes on Maps," Captain C. W. Wilson, R. E.: London, 1873.

N. B. Continental nations indicate the scales of their maps by the fraction that any linear distance measured thereon is of the actual distance. To construct a scale for such a map in terms of inches to the mile, divide 63,360 (the number of inches in a mile) by the denominator of the fraction of the given scale. Thus: a scale of $\frac{1}{33333}$ is 792 inches to the mile, since $\frac{63360}{81} = 792$.

equal to that between the contour planes of the map under consideration, using the scale to which the map itself is drawn. Lay a ruler so that its fiducial edge shall pass through the point thus determined and be parallel to the line A D. This fiducial edge will then intersect the several slope lines (as, for instance, that of 15°) at distances from A C equal to the intervals upon the map, between consecutive contour lines, corresponding to such slopes (15° , etc.).

For instance, let the line A B (Fig. 2, Plate V) represent such a fiducial edge intersecting the several slope lines at a, b, c, etc. It may be used directly as a scale in reading the contour intervals; thus: should the interval on any part of the map be A c, the corresponding slope would be 20° ; if equal to A f, then the slope would be 5° , etc. Should this interval (always to be applied to the scale from its left extremity) fall between any two divisions, as at x, it indicates, of course, a corresponding intermediate degree of slope, say 8° .

The scale, of which Fig. 1, Plate V, is a representation, will afford ready assistance in constructing, according to the above rule (I), slope scales corresponding to any contoured map.

Example.—Let the map be drawn to a 10" scale, and the distance between the contour planes be 50'; then will .095", say, 10th of an inch, be the distance to lay off upon the line A C, and the line through the point thus determined and parallel to A D will be the slope scale required.

c. TABLE D, OF SLOPES.

241. This table, quoted and slightly altered from Sir Garnet J. Wolseley's "Soldier's Pocket-book," page 212, gives a general idea of the influence of slopes upon the manœuvre and fire of the several "arms." It will prove of value to the Referee in connection with the study of contoured maps. (See ¶¶ 236 to 240.)

d. GRADUATED DIVIDERS, MANŒUVRE SCALES, AND RANGE, OR MAP SCALES.

242. These instruments will be found to answer all the requirements of rapid map study with blocks and miniature troops. They are made (Fig. 4, Plate V) upon the same principle as the ordinary builder's calipers. The arc D E is fixed to the leg C A, and works through, or by, the leg C B.

This arc is graduated from D outward, so that when the leg C B is opened out to any particular graduation, as, for instance, M, and there clamped, the distance embraced between the feet A B is equal to the map distance over which the blocks, etc., are to be moved at the rate (as a messenger, etc.) indicated on the arc. The reverse side of the arc may be graduated at column of route *depths*, or to suit convenience.*

2. MILITARY PIECES, TROOPS, ETC.

243. Slated blocks of wood and pasteboard are employed to represent troops, baggage, etc. They are found to answer admirably all the requirements of the Game, and to facilitate the accurate *keeping of records* in a way far superior to any method heretofore adopted. Each full set contains pieces enough to represent upon both sides (blue and red) the manœuvres of an Army corps, constituted as laid down in "Infantry Tactics," § 748. (See Appendix C.) The smaller sets contain pieces proportioned to the strength of a "Division of the Line" (see "Infantry Tactics," § 718), with one regiment of Cavalry attached.

244. They should be handled as little as possible, and, where it is desirable to mark upon their prepared surface, care should be taken to avoid scratching too hard or over the painted symbols found upon many of them. Sufficient space is left upon their faces to receive a great many "marks," if due attention is paid to neatness, and to the employment of small figures. For this purpose the pencil should always be kept sharp by the use of sand-paper.

245. The pieces are made to scale, so far as their *fronts* are concerned, as they generally represent bodies in line. In matter of *depth*, however, the scale has to be ignored.

* A manœuvre scale, similar to the one of which Fig. 3, Plate V, is illustrative, will be found convenient in laying off short distances upon maps to which the graduated dividers do not apply. The figure shows the face of the scale corresponding to *minute* manœuvres at various rates (see Table F) over a map drawn to a 10" scale. To use it: *Rule II.*—Place one leg of a pair of dividers at A, and open the other to the off-set corresponding to the distance and rate required. Upon the reverse side the same distances may be *halved*, and will therefore correspond to half-minute moves upon such a map, or to minute moves upon one at a 5" scale. The student himself can easily make such scales, and cut them out of zinc or other soft metal, so as to accommodate himself to the maps at hand. So long as the game intervals are not longer than five minutes each, the manœuvre scale will be found convenient; but when hours or days only are considered, it will generally be best to employ the range or map scale itself. (See Fig. 5, Plate V.)

246. The pieces employed in the Advanced Game may first be divided into three general orders or classes : Line, Skirmish, and Baggage or Train pieces.

1. *Line pieces* are made of *wood*, and have a silicate surface prepared to receive slate-pencil marks.

2. *Skirmish pieces* are made of heavy pasteboard, and have a silicate surface prepared for the use of the lead pencil. For purposes of distinction, they are also a shade or so lighter than the line pieces.

3. *Baggage* and *Train pieces* are also made of wood, are silicated like the line pieces, and are to be distinguished therefrom by symbols, etc.

a. INFANTRY PIECES.

247. *Infantry Line piece* (Figs. 1 and 2, Plate II). Taking the combatant strength of the American regiment at its full war quota of 1,000 rifles, it would represent a front of 500 men, and cover a line of some 305 yards' extent. The line pieces in this outfit are made to represent half-regiments of the above strength at a 10-inch scale. They are, therefore, .85 of an inch long, and two of them placed in juxtaposition just represent a front of 305 yards, or a regiment (Fig. 1, Plate VI). This allows 11.76 pieces without interval, or 5.8 regiments per mile. Under the ordinary circumstances of topography, 5 of such regiments, or 10 half regiments, may be allowed per mile, which gives ample intervals upon the map.*

248. Should it be desirable, as when studying movements upon a very large theatre, to reduce the scale of the maps employed, the above scale may be *halved*. This gives us 5" per mile, at which scale our half-regiment pieces become 1,000 strong, 5.8 of them will still go to the mile without interval, or 5 occupy their due topographical front by making suitable allowance for intervals.

249. *Infantry Skirmish piece* (Fig. 3, Plate II). This represents 100 men (1 company) at $1\frac{1}{4}$ yards per rifle; that is, in "thin firing line." It is .68" long. By arranging these pieces at their length apart (i. e., at 1" .36 from center to center, using a pair of dividers), a "heavy skirmish line" is represented ($2\frac{1}{4}$ yards per rifle; see Fig. 8, Plate VI). By arranging them

* A few line pieces representing divisions (2 companies) of a regiment are introduced for special purposes. (See Fig. 2, Plate II.)

at three (3) lengths apart, i. e., at a map interval of $2''\cdot72$, from center to center (Fig. 9, Plate VI), a "*thin* skirmish line" is represented (5 yards per rifle). On the other hand, if two of these pieces occupy the same space, i. e., one upon the other (Fig. 10, Plate VI), two companies are represented in "*heavy* firing line" (single rank at $22''$ per man), and, if four of such pieces are thus employed (Fig. 11, Plate VI), four companies in *Line of Battle* is the result, or in two ranks at $22''$ per man. Hence it is manifest that every formation peculiar to American battle tactics may be obtained by a judicious use of these pieces, reference being had to their value (100 men), their size $\cdot68''$, and the map employed, intervals thereon, etc. These same pieces can be used to represent companies, etc., in any formation or strength. They must in such cases, however, be suitably *marked*, and of course are no longer at *scale*.

250. *Infantry Tool and Reserve Ammunition piece.* (See Fig. 12, Plate II.) This piece is not made to scale. It is one half the size of the ordinary baggage piece; one of them should accompany each regiment in line, etc., to represent its intrenching tools and spare ammunition.

251. *Infantry in Column of route.* The occupation of *roadway* upon the map is best represented by properly *spacing off* thereon (Fig. 4, Plate VI) the several pieces supposed at any time to be in such columns. (See Table C.) To represent special tactical formations, etc., other than those of line or skirmish order, employ symbols, marks, etc. (See Plates VI and VII.)

b. CAVALRY PIECE.

252. *The Line and Skirmish piece.* The natural combatant formation of this *arm* being in single rank, no *special* line pieces are needed. The strength of the Cavalry company is taken at 100 sabers or carbines, the front occupied by each horseman in line at $40''$ * (Roberts), the interval between companies at 8 yards, and that between battalions at 16 yards. The regiment consists of 12 companies, and is divided into 3 battalions of 4 companies each.

253. Hence at a $10''$ scale the Cavalry company is $\cdot62''$ long, and represents a formation which is about the equivalent of the Infantry "*thin-firing line*." This piece is represented in Fig. 4, Plate II, and is distinguished by a diagonal yellow border across its ends. The battalion is represented

* Tactics=1 yard.

(Fig. 12, Plate VI) by placing 4 of these pieces at about .05" apart, and the regiment by three of such battalions at about .1" interval. To represent "*heavy* skirmish order," place these pieces apart at distances equal to their own length. "*Thin* skirmish order" is represented by placing them at map intervals equal to three times their own length, etc.

254. When desirable to represent Cavalry as dismounted and *fighting on foot*, Infantry Skirmish pieces should be employed, and the Cavalry pieces from which the dismount is made suitably marked or inverted, etc. In this case each Cavalry company may be regarded as sending 50 men on to the line, holding 25 as reserve, and having 25 as horse-holders.

255. By employing maps at a 5" scale, each Cavalry line piece will represent two companies, i. e., a half battalion, and the various intervals and formations above noted must be suitably modified.

256. To represent this *arm* in column of route, space the pieces off (Fig. 14, Plate VI) so as to occupy suitable depths of roadway. (See Table C.) To represent tactical columns and formations, other than line, arrange the pieces suitably, or employ symbols and marks on the prepared surfaces (see Plates VI and VII).

257. The Battalion piece used in the Battle Game may frequently be employed with advantage in the Advanced Game to represent battalions closed in mass *by companies*, held in reserve, etc., etc.

c. ARTILLERY PIECES.

258. The *Line pieces* (see Plate II). These are made to represent batteries (Fig. 6) and half batteries (Fig. 7). With each of them is an accompanying Caisson piece (Figs. 8 and 9) to represent the full supply of reserve ammunition, tools, forges, etc. Horse Batteries (Fig. 6) are indicated by yellow symbols, instead of white, which is used in other cases; and special weapons (Hotchkiss, Gatling, 3"-rifles, 12-pdrs., etc.) must be suitably indicated by abbreviations (H., G., 3", 12 Pdr., etc.).

259. The front occupied by a six-gun battery in the Line of Battle is usually laid down in general terms at 82 yards (Light Artillery Tactics, § 578). In foreign services it is rarely short of 100 yards, and is gradually increasing with the improvement of artillery. Making, therefore, a slight increase (up to 90 yards), the front of a battery at a 10" scale becomes about $\frac{1}{2}$ an inch,

and that of the half battery about $\frac{1}{2}$ of an inch. This gives, with 28 yard intervals between them, about 15 batteries to a mile.

260. When using maps at a 5" scale the half battery piece will be employed to represent a full battery.

261. In recording losses, etc., upon the Artillery pieces, the "marks" placed upon the Caisson piece should usually refer to horses (see ¶ 314); those placed upon the Battery piece to men (see ¶ 316).

262. The pasteboard pieces of the same dimensions as the line Artillery ones are added to afford players the means of detaching single guns, platoons, etc.

263. *Artillery in Column of route* will be represented by properly spacing off (Fig. 22, Plate VI) upon the roads, etc., the several pieces (see Table C).

264. Special formations (Tactical and others) will be represented by suitable arrangements, symbols, marks, etc. (See Plates VI and VII.)

d. THE ENGINEER PIECE.

265. *Line piece* (Fig. 10, Plate II) shows the piece furnished to represent Engineers. It will be taken to represent a company (150 men) in line or Column, with its tools, wagons, baggage, etc.

266. When it is necessary to subdivide this detachment, employ the Infantry *Skirmish pieces*, properly designating them. (See Appendix A.)

3. BAGGAGE-TRAIN AND OTHER PIECES.

267. *Baggage* of all sorts will be represented by the pieces shown in Figs. 11 and 12, Plate II. They are both marked with the same symbol, the latter being one half the size of the former. To represent special kinds of baggage, trains, etc., they should be further symbolized according to some such system of abbreviation as follows :

Field Telegraph.....	F. T.
Pontoons, Reserve Equipage.....	R. E.
" Advance Guard Equipage.....	A. E.
Wagons, Baggage, etc.....	W.
Signal Train.....	S.
Hospital (Field).....	H.
Ambulance	A.

Siege Train.....	S. T.
Head-quarters, Baggage, etc.....	H. Q.

They should also be itemized as to length, destination, etc.

In employing these pieces to represent Baggage, etc., upon the road, they should be spaced off at half their length intervals, and a sufficient number be employed to represent the train under consideration (see Table C).

268. Colors. These pieces (Fig. 14, Plate II) may be employed in the Advanced Game to designate Signal Stations, Bases of Operation, etc.

269. The piece represented in Fig. 13, Plate II, may be employed for various purposes, such as representing Commanders, Messengers, special commands, etc.

270. For further information concerning the constitution, personnel, etc., of the various tactical formations of the several "arms," and of the different classes of Trains, Reserve Columns, etc., the student is referred to Infantry, Artillery, and Cavalry Tactics and Manuals, U. S. Regulations, General Orders, etc., where full information will be found, and which should be rigidly applied in this and in kindred matters.*

* In this connection it may also be clearly stated at the outset that the principles of Grand Tactics, Strategy, and Logistics, the tactical use of "The Three Arms," their relative importance, the general principles governing their combined use, and such other considerations as are pertinent to the military art and science must likewise be studied in standard authorities. It is not in the province of a game of this description to originate principles or methods, but simply to afford entertaining and instructive opportunity of exercising the knowledge of them gained elsewhere by such extensive reading and close application as becomes an advanced military student. Consult Jomini, Hamley, Pierron, Wolseley, Dufour, Halleck, Lippitt, Wheeler, etc.

CHAPTER II.

DESCRIPTION AND USE OF THE TABLES.

1. TIME.

a. DURATION OF ENGAGEMENTS AND TIME REQUIRED FOR VARIOUS PURPOSES.

271. As the element of *time* is perhaps the most important one that enters into military considerations, the conduct of the Advanced Game has been based entirely upon it, and the time actually required in practice to accomplish undertakings similar to those studied in miniature upon the map must be duly considered in all possible cases. Tables G and L will render some assistance in making proper estimates in certain specified cases, and should be enlarged and corrected according to experience and study.

272. Most of the other tables will also be found to consider this all-important element to a greater or less degree.*

b. DESCRIPTION OF TABLE B, FOR RECORDING TIME INTERVALS.†

273. This table is intended to be employed both in the study of history and in playing an Advanced Game of any character. One of these tables,

* As players become more and more familiar with the general run and spirit of a game of this nature, the tendency to neglect tables and exercise their own judgment and memory increases. This is in full keeping with the object of the advanced study, and simply shows that those concerned have become educated by constant play, and by experience in the premises, up to the standard of self-reliance. Of course, such players should carefully discriminate among the various circumstances where the exercise of judgment enters, and be careful that they avoid, in their decisions as Referees, all that savors of the arbitrary and autocratic, two factors which influence the fortunes of battle less than any others in the whole range of its science.

† The necessity of special records and even of a *Recorder* increases with the magnitude of the study attempted. Here, for instance, upon the field an undertaking is made whose accomplishment will require some twenty minutes, while there, a message or signal, etc., is sent, the receipt of which it is extremely important should be sharply on time. Various plans and methods are adopted to meet this necessity, and concern not only the keeping of an accurate history of each game, but the more important matter of so conveniently regulating its actual progress that each event which is to

mounted upon a soft block of wood, accompanies each outfit, and together with a few colored pins will be found very convenient in keeping track of the passage of time. A simple examination of its construction, and of the following rule for its employment, is deemed sufficient to explain it.

Rule III. 1. Place *black* marking-pins in the squares opposite the numbers indicating the month, day, hour, etc., at which operations commence. These pins will not thereafter be moved. 2. Follow with *white* pins the various intervals as they transpire. 3. The separation of these pins will indicate at any moment the time already expired, the position of the white pins the moment under consideration, and that of the black ones, when the study commenced.

2. MARCHES AND MANŒUVRES.

DESCRIPTION OF TABLES E AND F.

274. The map being drawn to a scale, the various pieces are to be moved thereon only such distances as correspond exactly to the time under consideration in each Game interval.

275. These moves should be effected by the Referee and Umpires only.

276. In all cases of doubt and in special cases, such as very long marches, the Referee must use his judgment as to the rate, etc. This will be particularly necessary in movements over hilly country, bad roads, at night, etc., and where rapidity, secrecy, and kindred considerations enter the question.

277. Tables E and F, the former for use in long marches, the latter in manœuvre marches, give all the data necessary under this head. These tables are founded upon U. S. Service authorities and experience, Tactics, Manuals, Reports, Regulations, etc.*

take place in future time will be recalled at the proper moment. The best among these methods is to number the pages of an ordinary tablet, or of a cheap note-book, to correspond to minutes, hours, etc., and to record upon each sheet as it comes up those important events that are accomplished, begun, etc., at the moment under consideration. In keeping such a record, those events (such as the receipt of messages, etc.), which are to be relegated to *future* minutes, should be immediately carried forward and written upon their proper sheets, so that, when these latter are reached in the ordinary course of the Game, they will be properly announced, and receive due consideration. A simpler plan sometimes adopted is to rule a single sheet of foolscap for each player. Records may be kept upon such sheets with little danger of confusion, and the play of the various parties to the Game regulated to the minute. (See ¶ 320.)

* See Ordnance Notes, 107. The remark of Marshal Saxe that "victory resides in the legs of the soldiers" is more than ever true in modern warfare. The leader of troops must master the subject of Marches in all of its important strategic bearings before he can lay any claim to *generalship*. Wellington remarked that "The first requisite of a soldier is a good pair of shoes; the second, a spare pair of shoes; and the third, an extra pair of soles."

278. In Table E the hour columns show the best efforts that can be expected for a single hour or so ; the day columns show the same for several hours, the rate not necessarily being the same as in the hour columns, and the hours per day altering to accomplish the desired distance. Similar considerations affect the distances tabulated under the head of minutes and hours in Table F.

279. Of course, exceptional movements of extreme rapidity, as well as of astonishing slowness, may be authoritatively cited ; but such considerations can not be tabulated here, any more than they can be depended on in service. They will, therefore, command attention only as they become possible or necessary from special circumstances.

3. COLUMNS: HOW REPRESENTED; THEIR DEPTHS, ETC.

280. In the Game of Strategos the pieces are all made to a Line of Battle scale, and none are provided, as in foreign games, to represent the same bodies when in Column of Route, etc. The introduction of such additional pieces simply tends to confuse the study, as their use entails a constant exchange of pieces, and thus prolongs the game unduly. The same difficulties are not encountered upon the map as attend all manœuvres upon the field, and there necessitate those constant passages from line to column, etc., which must then be resorted to, not only on account of topography, but more especially as a means of avoiding the effects of hostile fire. Hence the tediousness of using such special Column pieces has tended to their being more or less generally neglected.

281. Nevertheless, as special formations are of vital importance in practice, they must be considered in some way upon the map. It is believed that the following rules will result in their full consideration without the use of extra pieces :

1. In Campaign studies, troops, etc., will always be regarded as either in appropriate columns when in route, or in bivouac, camp, etc., when at the halt ; and the players may be called upon by the Referee to elucidate the proper dispositions to be made, precautions to be taken, etc.

2. In battle studies, troops actually engaged will be assumed to be in line, company columns, etc., according to the circumstances of each case ; an appeal to a previous notification, to records, etc., of course, being always a preferable mode of settling disputes upon questions arising in the study.

3. Troops not engaged will generally be regarded as in some suitable "marching order," unless the Referee is specially notified as to their deployment into battle line and readiness for action.

4. Very short distances, under favorable circumstances, may be gained in Line of Battle, though, in general, company columns, or some other specified and suitable formation, will be taken for granted in more extended manœuvres. The employment of the Skirmish pieces already explained affords a general solution to this perplexing subject.

5. *Time* will always enter as an important element of consideration in every specified or assumed change of formation.

6. In special cases, formation may be suitably designated by the tactical arrangement of the several pieces, by brief notes made upon them, etc. (See Plates VI and VII.)

282. In connection with rates of march, columns, etc., attention is called to Table C, which gives an average depth for the several tactical columns therein considered. No allowance is made for the lengthening out of such columns. This varies according to circumstances, and is a most important element of consideration. It is, of course, greatest with large bodies, and in long marches, bad weather, heavy roads, etc. The tabulated depths can rarely, if ever, be preserved, and should be increased from one fifth to double the amounts given, according to circumstances.*

4. SPECIAL TRANSPORTATION, RAILROADS, ETC.

283. Such subjects must be studied up and tabulated for the Game, in the same way and from the same sources, that they have to be in actual practice. A few simple data concerning Railroads only are given in Table "s," Appendix G, as an example of the character of the statistics which may be collected together in convenient form upon a subject of so much military importance.

* The Referee should closely attend to these subjects, to wit: rates of march, depths of columns, and changes of formation, lest the first be over-estimated, the second, under-estimated, and the third, neglected. Consult "Les Methodes de Guerre Actuelles et vers la fin du XIX^e Siècle," by Lieutenant Colonel Pierron, Paris; Dumain, 1878; 2 volumes, pp. 732 and 921; price 12 francs. (A third volume is still to appear.) This book is perhaps one of the ablest military publications of the century, and "is recommended without hesitation to all who are interested in military matters." For a brief exposition of the nature of its contents, see also Ordnance Notes 107, page 69.

5. DESCRIPTION OF TABLE I, GIVING RATIOS OF POSSIBILITY TO ADVANCE, ATTACK, MAINTAIN POSITION, ETC.

284. During the progress of an Advanced Game perplexing questions as to the *possibility* of making this or that movement, effecting such and such changes, maintaining contested advantages of position, etc., are constantly arising. Such points are particularly difficult to agree upon, but must always be fairly met, not only on account of their frequency, but more especially because of the decided bearing they necessarily exert upon the interest, current, and final result of the game itself.

285. Upon the Battle-field all such points are regulated by *morale*, force of arms, and the relative degrees of persistency of the contestants, or, rather, are apparently self-regulating; but this, of course, can not be the case in mere map study assisted only by inert blocks, no matter how perfectly conducted.

286. The decision in all such cases devolves more or less upon the Referee himself, but should seldom be so rendered as entirely to foreclose the question; it should rather be formulated into a *ratio*, in which both sides receive due consideration, and under which, by suitably consulting the dice, a decision can be arrived at without prejudice to either side.*

287. Table I will be found of great convenience for reference in these premises. It by no means covers all the cases liable to arise in action, but, to say the least, it is *suggestive*. In all such cases a large discretion must be exercised, and, when tabulated data do not exist or are inadequate, the Referee must originate.

288. *Cæteris paribus*, possibility should be determined according to ratios expressing the relative numerical strength of the contestants, the favor of the ground, initiative, etc., and generally it will be found that several of the elementary ratios given in this table will conspire with those of strength, position, etc., to influence the final ratio with which the decision is ulti-

* Those familiar with the foreign methods of the War Game will notice that, by using ratios directly, the scope of analysis is greatly enlarged, in fact, becomes unlimited. The ratio, too, is appreciated more readily by the military mind than the "*index point*" used abroad. In the employment, however, of either, as a means of deciding questions in the Game, some limit seems to be necessary. This in foreign systems is taken at an index point corresponding to 5:1, all ratios over that being regarded as *certain* for the side in whose favor they stand. In the system here recommended, we place no limit, preferring to allow each set of players to choose their own. The "*chances*" are seldom so adverse as to preclude all hope, and we should no more preclude its full exercise upon the map than we should deny the ride of Sheridan to Winchester—a charge of victory into the very face of defeat and disaster!

mately to be made. Hence we may deduce the following rule for the employment of ratios in this and similar considerations :

Rule IV. Express the various elements of possibility, chance, etc., entering into any particular case in the form of ratios, using Tables I or S, as the case may be, giving to each individual consideration its own independent ratio. Multiply these several ratios together, term by term, taking care that terms corresponding to the same color in the elementary ratios are used as factors of the same term of the compound ratio. Reduce the resulting ratio to its simplest terms, and it will express the relative circumstances of possibility or chance entering into the particular case under consideration.*

Example I. Three companies of Skirmishers (blue) advancing in the open to the attack of a battery of Artillery (red), already in action but not under cover, have arrived within 350 yards unchecked. *Is a further advance possible?* Percentage of losses for Skirmishers equals 15.

Case 4, Table I, fixes the ratio for two companies so advancing as 3 : 2 in favor of Skirmishers. So far as numbers (strength) are concerned (see Note to Case 3, Table S), the ratio is 3 : 2 also in favor of the Skirmishers. Hence, applying Rule, we have Blue : Red :: $3 \times 3 : 2 \times 2 = 9 : 4$. If the case be unimportant, an approximation may be made, and the ratio regarded as 2 : 1 in favor of blue.

Example II. Let us take a more complicated example. Two regiments of Infantry in the open are slowly advancing in line, and supported by one battery on their extreme flank, all red. It is desired to oppose their further advance by throwing two light batteries (blue), hitherto in reserve and concealed behind a hill, into position against them. Question raised : *May the blue batteries come into action?* Additional circumstances : they (blue) make the attempt ; red estimates the range correctly, 400 yards, and opens a deadly fire upon them, inflicting serious damage upon the moving batteries. The Referee, however, decides, on account of special circumstances of previous cover, freshness, suddenness of the move, and the shortness of exposure, that an additional element of possibility favors blue 4 : 1.

The case then stands as follows : There being 4 Infantry and 1 Artillery units of numerical equivalence (see Note to Case 3, Table S) in favor of red

* With this resulting ratio, the dice are to be consulted, as hereinafter to be explained, in order to arrive at a final decision.

and 2 in favor of blue, the ratio as to numbers is 5 : 2. Case 10, Table I, gives an elementary ratio of 6 : 1 in favor of red Infantry as against blue Artillery, and Case 11, same table, gives another ratio of 4 : 1 in favor of red, on account of its supporting Artillery. Compounding these several ratios, and including the special one above allowed, we have Red : Blue :: $5 \times 6 \times 4 \times 1 : 2 \times 1 \times 1 \times 4 = 15 : 1$ in favor of *Red*.

6. METHODS OF EMPLOYING THE DICE TO DECIDE QUESTIONS OF POSSIBILITY, EXPRESSED UNDER THE FORM OF RATIOS. TABLES J AND K.

289. A general ratio, indicative of the relative circumstances of possibility in any particular case, having been arrived at, the question may be decided by an appeal to one or more dice, according as the ratio is high or low. Whenever the ratio is not greater than 5 : 1, Table J should be employed ; in other cases, Table K. Whenever possible, however, by simple approximations, the preference should be given to the former table.

a. DESCRIPTION AND USE OF TABLE J (EMPLOYMENT OF DICE).

290. The left-hand column, of Table J contains various ratios up to 5 : 1. Along the top line the several faces of a single die are displayed, and in the corresponding vertical columns these faces are assigned to one or the other side, as the case may be. The table is so arranged as to give to each color a number of faces of the die proportional to its term in the corresponding ratio. Thus, opposite 5 : 1 in the table, five squares are marked 5, and one 1, thus giving five corresponding faces of a die to the preponderating side and but one to the other. Hence, to use the table—

Rule V. Throw a single die once. The word, or ratio figure, upon the square opposite the ratio under consideration, and in the vertical column headed by the face of the die which turns up, indicates the *winning* side. If such square is marked 0, there is no decision, and the die must be reconsulted.

Example I. The ratio being 2 : 1 in favor of *blue*, the die is thrown, and :: turns up. The decision is therefore in favor of the side having 2 chances—i. e., *blue*.

Example II. The ratio to be decided being 4 : 1 in favor of *red*, let the die be thrown, and suppose . turns up. This corresponds to 0 ; hence there

is no decision. The table is now reconsulted, and we will suppose :: turns up; the side having 4 chances (red) is the winner. Had . turned up, the side having but 1 chance (blue) would have won.

b. DESCRIPTION AND USE OF TABLE K (EMPLOYMENT OF DICE).

291. Table K is to be employed whenever the ratio under consideration is greater than 5:1. It is founded upon the mathematical chances of obtaining certain desired combinations of spots with several dice in a given number of throws. For instance, suppose the ratio to be 17:1 in favor of *red*; blue then has 1 chance in 18. Now, if two dice are thrown *once*, the chances are 17:1 against a combination of 3 spots, i. e., against . and . turning up, etc. Hence, to use this table, we have the following rule:

Rule VI. Consult the dice *once*, throwing with the number called for opposite the ratio under consideration at the time. If the corresponding combination of spots results, the party to whom the ratio is *adverse wins*; otherwise, he loses.

Example. Let the ratio be 35:1 in favor of red. Consulting the table opposite this ratio, we find that two dice must be thrown, and a combination amounting to two spots must be sought. The dice are thrown; let the result be seven spots, hence *red* wins. Had, however, two aces, i. e., a combination of two spots, resulted, *blue* would have won by his only chance, since the chances are that such a combination will result once only in every 36 throws, and therefore are 35:1 against its resulting the *first* throw.*

7. TABLES OF CASUALTY (M, N, O, P, Q) FOR CALCULATING THE LOSSES INCURRED UNDER THE VARIOUS KINDS OF FIRE.

a. DESCRIPTION OF THE TABLES.

292. These tables will afford assistance in calculating the casualties due to Infantry and Artillery fire.

* Of course, in many cases, to make these tables applicable, approximations must be resorted to. They must always favor one or the other side, however, and therefore the benefit should generally be given to the weaker. In important and closely contested games, such approximations may generally be avoided by a very simple examination of the ratios contained in the tables. Such an examination will show that they may be employed to settle very many and irregular ratios not tabulated. Suppose, for instance, that by the application of Rule IV some such compound ratio as 3:4 resulted. This is very nearly *even*. If, however, it is desirable to decide the case on the merits of that very ratio, it may be accomplished as follows: The ratio does not obtain in either table, but it is evident that 3:4 in favor of red is 4 chances in 7 in favor of red; now, from Table K we see that red's chances

293. The losses given are those occasioned *per minute along a stationary Infantry Line of Battle.*

294. The tables give the whole number supposed to be put *hors de combat* by such fire, one sixth of which, should it be desirable to analyze further, may be recorded as "killed," and five sixths as "wounded." (See Appendix E.)

295. The numbers given in these tables vary all the way from about one half the effect of "cool target practice" (rate varying with range) down to *no effect*, and thus afford the Referee a very wide field, within which his decisions should be governed by such general principles and special considerations as each case involves.*

296. It will be noticed that the several tables of casualty are similarly arranged. The body of each is divided into 24 columns; these columns contain the estimated losses corresponding to the various ranges given, these losses diminishing for each range across the 24 columns from left to right.

297. To facilitate the consultation of these tables under the varying circumstances certain to arise, these columns are first divided into four special groups, headed, respectively: Deadly, Heavy, Ordinary, and Ineffectual fire. The six columns of each of these groups are severally headed by one of the faces of a die, the spots being so arranged as to decrease in regular order from left to right in each group. Each table is still further divided into halves, headed respectively Good Effect and Poor Effect, under each of which

are 1 in 7 to throw 6 with two dice the *first* throw; hence, by allowing him *four* such throws, he actually tries his luck as expressed in the ratio 3:4, etc. For a further consideration of this subject, consult Appendix I.

* It would be out of place here to discuss the numerous considerations that have assisted in the formation of these tables. The subject will be found treated at more or less length in Appendix F, to which the advanced student is referred. The results here tabulated are far within what ought to be, and what no doubt may be, the experience of future wars, even with our present, and certainly with our possible weapons; and they, at least fairly, approximate to the *relative* "effect" of the several weapons and projectiles considered. The subject of "casualty in action" is of paramount importance in the problem of modern warfare; it is wellnigh impossible to keep apace of it, and, perhaps, hopeless to anticipate its furthest reaches: nevertheless, it is the most important branch of military study, and one we certainly can not afford to leave wholly to the disastrous arithmetic of Battle-field solutions. The study of this subject comes legitimately within the scope of an Advanced Game of War, and hence it has been sought to make these tables not only of Game, but of some intrinsic value. Their antecedents are therefore given with copious references and notes. In this connection we may suggest the special importance of games in which *casualty* only is studied. Let the forces on each side be taken already in position, and let the problem be, particularly, how to avoid loss ourselves while we inflict the maximum of punishment upon our opponents. Tactical formation, cover, quality and quantity of fire, and the relative effects of its various phases, etc., will thus become prominent, a liberal acquaintance with which is becoming more and more of an indispensable element to successful leadership.

headings will also be found the faces of a die similarly arranged. Finally, each table itself is headed Uncertain Effect,* under which general heading the faces of a die are again severally displayed in the same order.

b. TO EMPLOY THE TABLES.

298. The Referee, being satisfied as to the character of the "effect" to be allowed in any particular case, will specify the column to be consulted, designating it by spots and group; thus, he may announce, " . . ; Heavy fire allowed." This at 400 yards range gives for Infantry fire a loss of 84 men per minute for every *tabular unit* firing. Should, however, the Referee be doubtful as to the column, though convinced that Heavy fire should be allowed, he may so decide, and the losses of the party under fire will then be determined by consulting a single die, thrown once, to designate *which* column of the group to use. Should Good or Poor Effect only be announced, a single die thrown once (either by the Referee, or by the Umpire of the side under consideration) will designate the group, and thrown again the column.

In similar manner a die thrown three times, under a decision of Uncertain Effect, will point out the particular column to be employed. Such doubtful cases may be decided much more expeditiously by throwing a suitable number of dice together. The faces thus turned up are to be consulted from *highest to lowest*, or *vice versa*, according as Good or Poor Effect is favored and previously announced by the Referee. Thus, suppose three dice thrown together once result as \therefore , $\cdot\cdot$, and \cdot , the tables consulted according to these faces from *highest to lowest* will carry us to Good Effect corresponding \therefore , Heavy fire to $\cdot\cdot$, and the sixth column under the latter corresponding to \cdot . This same throw consulted from *low to high* (i. e., favoring Poor Effect) would have pointed to the second column under Inflectual fire. The table may also be consulted from medium to high or low.

299. The methods, in fact, of consulting tables thus arranged are almost without number, and it is, therefore, manifest that the Referee may graduate his decisions all the way from the most absolute uncertainty to the utmost explicitness.

300. The officer who orders firing to commence will be called upon to state the character of fire to be employed, to make an estimate of the range,

* These, of course, are merely relative and conventional terms.

and to answer any other pertinent questions the Referee may see fit to put. Upon his estimate, his answers, and the circumstances surrounding the particular case * will depend the "Effect" secured by his fire.

301. Generally speaking, incorrect estimates of range, injudicious answers, etc., will entail Poor Effect, though not necessarily "no effect," unless other disadvantageous circumstances also conspire against it. (See § 1202, "Light Artillery Tactics".)†

302. In the case of *Artillery*, where incorrect estimates of range have been made, and where no reason exists to the contrary, about three rounds, or one or two minutes, will be required to find it; after which, if the fire continues, the "Effect" first secured may be allowed to *improve* across the table, from *right* to *left*, until a due "Effect" is attained.

303. In the case of *Infantry* fire, however, an incorrect estimate of range is more apt to entail a permanent disadvantage, because the chances of detecting the error are (except upon the Skirmish Line) very slight. This lack of "Effect" becomes more serious as the error of the estimate increases, and, for the same amount of error, is, of course, greater for the more distant ranges. The Referee will decide in all such cases the character of the "Effect" to be allowed, and whether improvement, reestimates, etc., may or may not be made. Except, however, in special cases, Artillery fire that opens with incorrect estimates of range will not be allowed to improve beyond Heavy fire, nor Infantry beyond Feeble fire.

304. When casualty is not the subject of special consideration, but is only of incidental importance in a game or study, the group in each table headed Ordinary fire will be habitually employed. So, also, as a general rule, the column headed :: of this group may be taken as a *standard* one, those of Heavy and Ineffectual fires being resorted to according to circumstances, and that of Deadly fire being allowed *only in the most exceptional cases*.

* Character of the object, nature of the ground in its front, relative position of the opposing forces, extent of "dangerous space," *morale* of the firing party, nature of cover (if any), etc.

† Where the range varies during an interval for which the casualties are to be calculated, it is usual to take an *average* range as the basis of calculation. So, likewise, in general, where position, tactical formation, etc., alter during such a Game interval, the rule is to average the corresponding multipliers. For instance, 2 Companies of Skirmishers advance firing from 800 to 500 yards; their target is a Line of Infantry in single rank lying down for 5 minutes, but which rises to a kneeling position during the last 5 minutes. The average range in this case is 600 to 700 yards (650), and the average exposure of the line under fire, in so far as their position is concerned (see Table R), is $(\frac{3}{4} + \frac{1}{4}) \div 2 = \frac{1}{2}$ for the whole ten minutes. By the simple expedient of averaging, some of the most complicated modifications of fire may thus be very fairly approximated to.

305. In general, the following rules will govern the Referee in graduating the allowance of "Effect" :

Deadly fire will be allowed only in the most exceptional cases. It corresponds to the most advantageous situation (position), excellent moral condition, more or less perfect cover, an exceptionally favorable mark, accurate estimate of range, thorough preparation and intention (suddenness at short range, etc.). It will rarely, *if ever*, be allowed ; nevertheless, it may at times be realized in action even to the fullness of the tables.

Heavy fire corresponds to a favorable situation, estimate, condition, and mark, no undue excitement, deliberate intention, possibility, etc. ; on the whole, it is exceptional.

Ordinary fire * corresponds to an *average* situation, estimate, condition, and mark, to the usual conditions of exposure, excitement, exhaustion, etc. This group will be habitually employed, the column headed :: being the favored one, from which it will be allowable to go right or left across the table only for good cause.

Ineffectual fire corresponds to a very poor position, widely erroneous estimates of range, a badly shaken and demoralized condition, a poor mark, lack of any intention, a surprisal into fire, etc.

306. As a rule, the players will only be informed of the data necessary to calculate the losses of *their own side*, i. e., those resulting from the fire of their opponents. This calculation will be made under the supervision of the Referee, or the Umpire assigned to such side. The party firing may or may not be more or less fully informed of the "effect" secured, according to the nature of the fire and other circumstances.

307. Ranges are generally indicated in the tables as follows : "200 to 300 yards," "300 to 400 yards," etc. But, in map study, all sorts of ranges come up for consideration. When, therefore, a range lies between two such tabulated ranges, the "Effects" opposite them are to be considered ; thus, 235 yards lies between 200 and 300 yards, and the "Effect" is to be selected opposite them. It will often happen, however, that *even* ranges, as 300 yards, etc., come under consideration. In such cases preference will be given to the *first* line in which such ranges are mentioned, i. e., in the case cited (300 yards). The "Effect" will be taken from the line corresponding

* N. B.—Losses incurred, etc., and previous conditions and circumstances of action very greatly influence the effectiveness of fire.

to "200 to 300 yards," in preference to that corresponding to "300 to 400 yards."

308. In the case of *night firing*, Infantry beyond 200 yards and Artillery beyond 500 yards will be allowed only Poor Effect. But guns directed by day at the heads of saps, works, etc., may (Referee) be allowed to continue effective at night, and, if so decided, may delay the work.

309. In cases of *sharpshooting*, occasional fire, etc., the Referee will decide upon the "Effect" according to circumstances.

Example. 1 Battery of 12-pdrs., using case shot at 1,500 yards range, and 200 men in "thin skirmish order" at 900 yards range (all red), fire for the space of 2 minutes upon an opposite Infantry Line of Battle (blue). *What are the casualties for blue?*

The Referee allows Artillery only "::: Ineffectual Fire," and to the Infantry "Ordinary Fire," the latter throwing ::.

Calculation. From Table O, opposite 1,200–1,600 yards and under "::: Ineffectual Fire," we find the "Effect" allowed for 1 minute is 4; hence, for 2 minutes, the artillery puts 8 men *hors de combat*. From Table M, opposite 900 yards and under ":: Ordinary Fire," we find an "Effect" of 27 men for 100 shooting 1 minute; hence, as double that number fire, the "Effect" is 54 for 1 minute and 108 for 2. The total number of casualties for blue is, therefore, $8 + 108 = 116$, or 19 "killed" and 97 "wounded." *

8. DESCRIPTION AND USE OF TABLE R, OF "MULTIPLIERS."

310. The "Effects" contained in the several tables of casualty have been calculated with special reference to certain assumed conditions. For instance, the target in every case has been taken to be a stationary Infantry Line of Battle, the battery has been assumed as the firing unit in the case of Artillery, and 100 men, in "thin skirmish order," as the tabular firing unit in that of Infantry. But, in the continually changing phases of actual combat, this fixed condition of affairs can not always be expected to obtain.

* N. B.—The loss thus arrived at seems at first glance to be very severe and almost improbable, but it should be remembered that the circumstances in the present example are all in favor of the firing party, and that it is just this deadliness of modern fire when employed against the old-fashioned Line of Battle that is now forcing its universal abandonment, and the adoption of the modern "skirmish order," with an habitual resort to all the expedients of cover, position, etc., which tend to reduce losses to a minimum.

The losses incurred by Artillery and Cavalry, as well as those of Infantry, must be determined; the troops *firing* are now in one formation, then in another, and those *exposed* are as liable to be in one tactical order as in another. Position, weapons, nature of the fire, time, numbers, and various other circumstances come into the problem, and all influence its solution.

311. Hence it will be necessary to vary from the "Effects" tabulated whenever the same circumstances do not obtain. This can be accomplished by means of *multipliers*. Let us take an example. Suppose that Cavalry in Line is under fire, instead of Infantry. It is evident that a direct application of the tables will not give results which may be intelligently employed in the determination of the losses which this "arm" would incur under the several fires contemplated in them, and for the following, among other reasons. The arrangement of Cavalrymen in Line leaves about $1\frac{1}{2}$ foot intervals between them, although they may be boot to boot. In other words, while an Infantry Line has two men (one in the front rank and one in the rear) to every two feet of front, the Cavalry has only a single rank and but one man to every 40 inches of front; hence, under equal circumstances of exposure, the Cavalry Line will suffer only $\frac{1}{16}$ ths the Infantry loss. But every Cavalryman is provided with a horse, which presents more front to the enemy's bullets than his rider, in the ratio of about 2 : 1, by which same ratio the casualties in horses should exceed those in men; and as a Cavalryman *dismounted* is, to all intents and purposes, so far as his own "arm" is concerned, *hors de combat*, we should regulate our allowance of Cavalry casualties by the loss of *both* horses and men. Now, the Cavalry Line as a target compared with that of Infantry troops is, by reason of greater height, in the ratio of about 8 to 5. Combining, therefore, the above quantities, by each of which the Infantry losses already determined must be proportionately affected, we obtain $(\frac{1}{16} + \frac{2}{5}) \frac{5}{8} = \frac{2}{5} \frac{5}{8} = \frac{1}{4}$, say $\frac{1}{4}$ ths (+) as the multiplier, by which any Tabular Effect allowed must be affected when *Cavalry in Line* is considered.

For men alone the ratio becomes $\frac{1}{16}$ (say $\frac{1}{16}$), and for horses alone we have, say, $\frac{5}{8} - \frac{1}{16} = \frac{9}{16}$.

312. In a similar manner we may determine other multipliers, by the assistance of which the tables of Casualty, which are calculated only for special cases, may be made universally applicable.*

* The range which may be actually covered by such a table of modifications is very wide, and the field of study opened up to the military student very interesting. The subject of *color*, for instance,

313. Table R contains a number of such multipliers, which are to be employed in the more frequently recurring special circumstances incident to action. They will be used as follows :

Rule VII. Combine as factors the several multipliers which correspond respectively to each of the special conditions entering into any particular case, regard being had both to the party *firing* and to that *exposed*, and with the resulting quantity multiply the "Tabular Effect" allowed. The result will apply to the case under consideration.

For the sake of convenience, and to facilitate the consultation of Table R, the multipliers affecting each case should be sought for habitually as follows :

ORDER OF PROCEDURE IN USING TABLE OF MULTIPLIERS (R).

- | | |
|-----------------------------|--|
| 1. Character of Troops. | 10. Influence of Slopes. |
| 2. Tactical Formation. | 11. Nature of Cover. |
| 3. Posture. | 12. Engineer Work in Progress. |
| 4. Weapons used. | 13. Nature of Ground in Front. |
| 5. Nature of Fire. | 14. Material of Cover. |
| 6. Tabular Unit. | 15. Moral Condition. |
| 7. Quality versus Quantity. | 16. Miscellaneous : Efficiency, Diminished Rapidity, Special Modifications, etc. |
| 8. Time. | |
| 9. Motion. | |

Example I. A battery of blue Artillery is under the direct fire of 200 Infantry, in "heavy skirmish order," at 400-500 yards' range. Required, *the losses of the battery during five minutes?*

The Referee allows the Skirmishers "Ineffectual Fire," and :: turns up; the "Tabular Effect" (see Table M) is, therefore, 13 men. The several multipliers that affect the result are given in Cases 9, 16, 54, and 62. These modifiers are respectively $\frac{1}{15}$, $\frac{1}{3}$, $\frac{2}{1}$, and $\frac{4}{1}$; hence, by the above rule, we have,

is a most important one upon the Field of Battle, red and white being probably twice as deadly as blue, while gray, dark brown, and Lincoln green are generally regarded as the least liable to detection. These and a vast number of similar considerations, incidental to the problem, are, however, necessarily omitted from such a table as we here offer. It should be stated, too, in this connection, that absolute accuracy can hardly be expected from such data. This, in many cases, however, is more or less practicable, though the main desire in the premises is to secure such a *relation* among the several classes of multipliers as shall suggest to the student the advantages and disadvantages of the things to which they correspond.

$\frac{1}{15} \times \frac{7}{8} \times \frac{2}{1} \times \frac{5}{1} = \frac{7}{12}$, and $\frac{7}{12}$ of 13 = $7\frac{7}{12}$, say, 8 men, or about 1 "killed"

and 7 "wounded." (Cases 1 and 45 also apply; but, as the multipliers in each are *unity*, they may be omitted.) The number of horses (Case 7) put *hors de combat* are $\frac{2}{3} \times \frac{7}{8} \times \frac{2}{1} \times \frac{5}{1} = \frac{35}{6}$ and $\frac{35}{6}$ of 13 = 76.

Example II. A battery of red Artillery coming into action is enfiladed with case-shot from (3) three 12-pdrs. (blue) at 1,500 yards. Range being known, *what are the casualties of red during three minutes?*

Referee allows "∴ Heavy Fire"; Tabular Effect is, therefore, 46 men (see Table O).

To determine the loss in cannoneers, Cases 5, 9, 47, 54, and 62, apply; and the resulting multiplier is

$$1 \times \frac{1}{15} \times \frac{2}{1} \times \frac{1}{2} \times \frac{5}{1} = \frac{1}{5} \text{ and } \frac{1}{5} \text{ of } 46 = 9 \text{ men, i. e., } 1 \text{ "killed" and } 8 \text{ "wounded."}$$

To determine the loss in horses, Cases 7, 47, 54, and 62, apply;

$$\frac{1}{3} \times \frac{2}{1} \times \frac{1}{2} \times \frac{5}{1} = 1, \text{ and } 46 \times 1 = 46 \text{ horses.}$$

To determine the loss in drivers, Cases 10, 47, 54, and 62, apply;

$$\frac{1}{20} \times \frac{2}{1} \times \frac{1}{2} \times \frac{3}{1} = \frac{3}{20} \text{ and } \frac{3}{20} \text{ of } 46 = 6.9, \text{ say } 7, \text{ i. e., } 1 \text{ "killed" and } 6 \text{ "wounded."}$$

9. EFFICIENCY OF ARTILLERY.

a. RELATION OF LOSS OF HORSES TO THE EFFICIENCY OF A BATTERY AS TO MANŒUVRING.

314. A foot battery has about 115 horses which can be depended on to manœuvre the guns upon the field. It requires at least 4 horses per gun and 2 per caisson to "limber up" and get off under fire. This makes 36 horses necessary as the minimum for effectiveness. Hence, it is the loss of the 79th horse which reduces a battery to this critical condition. The loss of the 80th horse necessitates the abandonment of a caisson, and every further loss of 2 horses entails the abandonment of an additional caisson. When 90 horses are "killed and wounded," all the caissons are to be left behind (lost), if necessary to move the position of the battery. The loss of

the 92d horse necessitates the abandonment of 1 gun, and that of every four horses thereafter the abandonment of an additional gun, until 112 horses are *hors de combat* ; after which, the whole battery must be regarded as powerless to move.

315. The losses in horses should habitually be kept upon the Caisson pieces accompanying each battery.

b. RELATION OF LOSS OF MEN TO THE EFFICIENT "SERVING" OF A BATTERY.

316. There are 96 men who in case of dire necessity can be depended on to "serve the guns." This is 16 men per gun. It requires 8 men to serve a gun (muzzle-loaders) efficiently ; 6 men will serve it with three-fourth effect, 4 with one-half effect, and 3 with one-fifth, after which it is practically *silenced*.

Hence, we may enunciate the following :

48	Men lost (8 per gun left), battery at minimum effective strength	= 1
60	" 6 " " the efficiency of battery is	= $\frac{3}{4}$
72	" 4 " " " "	= $\frac{1}{2}$
78	" 3 " " " "	= $\frac{1}{3}$
79	" 3 " left at 5 guns " "	= $\frac{1}{6}$
82	" 3 " " 4 " "	= $\frac{1}{4}$
85	" 3 " " 3 " "	= $\frac{1}{10}$
88	" 3 " " 2 " "	= $\frac{1}{15}$
91	" 3 " " 1 gun " "	= $\frac{1}{30}$
94	" 2 " " 1 " "	= 0

317. The losses of a battery in "men" should habitually be kept upon the Battery piece itself, where it will afford an instant index of its condition as to efficiency at any moment.

10. EFFICIENCY OF MACHINE GUNS.

318. *Hotchkiss's Revolving Cannon.* The loss of horses influences the power of manœuvre of this gun in about the same ratio as that of 3" and 12-pdrs.

As to the diminution of efficiency resulting from the loss of cannoneers, etc., see remarks on the Gatling Gun, which follow.

319. The Gatling Gun. One battery has 62 horses (maximum) to depend on. With 24 horses (2 per gun and 2 per caisson) it is at its minimum. The loss, therefore, of 38 horses puts this battery at its minimum. The loss of the 39th horse necessitates the abandonment of 1 caisson, if the battery is on the march, or in action and required to "limber up." The loss of every additional two horses requires the abandonment of another caisson, until 49 horses have been put *hors de combat*, when all the caissons must be regarded as abandoned.

The loss of the 51st horse, for the same reason, causes the abandonment of 1 gun. The loss of every additional 2 horses thereafter requires the abandonment of another gun, until the 61st is *hors de combat*, after which the question of "limbering up" and getting under way is foreclosed.

The efficiency of a Gatling battery (and generally of machine guns) diminishes about twice as rapidly as that of an ordinary field-piece with reference to the number of men killed and left to serve it. Hence, one half the multipliers which represent the efficiency of a field-piece will be taken to correspond to the same losses for a Gatling, Hotchkiss, and other machine guns, after they have been reduced to their minimum efficient strength per gun.*

11. DESCRIPTION OF TABLE W, FOR THE GENERAL RECORD OF LOSSES, CAPTURES, ETC.†

320. This table or score-board is constructed upon similar principles to Table B. Two of them (one for each side) may be ruled and mounted

* In foreign games, in the case of Artillery losses, 25 casualties (men) are generally supposed to be equivalent to the additional loss of 1 gun, commencing the estimate at the full strength.

† We introduce this table simply as a matter of information. Its employment, however, is, upon the whole, to be discountenanced, and for the following, among other reasons: 1st. It is believed that the loss of even *one half the effectives* does not necessarily reduce a formation to demoralization (see General Zeddler's reports on the Russian losses [see also Appendix F, Section VIII, Note A, ¶¶ b, g, h, i, p, and r], since the Russian lines still continued to push on, undeterred, against the Turkish works in the face of just such losses). The foreign systems of Kriegsspiel assume a loss of one third strength (the old Napoleonic rule) as equivalent to total inefficiency, a figure, however, which is here unhesitatingly pronounced as far too low in the face of this latest modern experience. Hence, if such a system is to be favored *at all*, we should place the figure of inefficiency as not less than one half; but, 2d, with the system of *slated* men furnished in this outfit, such records can and ought to be put upon *the very body of troops that incurs the losses*. Such a method causes each block to show at all times its actual condition as to strength or effectiveness, and, whether an arbitrary rule as to their removal be adopted or not, avoids all confusion as to which particular piece should be removed, etc. The importance of this method can not be too strongly urged. In the system of Meckel the need of some such method is recognized so clearly that special columns are recommended in the record tables for the losses incurred by each several tactical unit under fire.

upon soft wood or pasteboard, and employed for recording losses and captures, these being scored with *red* pins for the red side, and with *blue* ones for the other. The pins will, of course, be shifted as fresh losses are incurred. The several formations being regarded as of full strength, the loss of more than 50 men in the case of Infantry and Cavalry may, if the players so agree, entail the removal of one company from the map. In a similar manner a company of Engineers may be supposed to be rendered non-effective by the loss of more than 75 men. It is important to state here, in connection with the subject of records, that any ruled blank may be *washed over with a transparent coat of white silicate slating*, and in this condition used an indefinite number of times, the lead-pencil marks and records being sponged off at the termination of each game. Such blanks will be very convenient in the studies connected with the War Game.*

12. DESCRIPTION OF TABLE S, ENUMERATING THE "CHANCES OF SUCCESS" IN CERTAIN SPECIFIED CASES.

321. In spite of the skill with which it is planned, and the determination with which its execution is attempted, there enters necessarily into every elementary attack, made during an engagement, a certain unknowable element which is entirely beyond control. Of the "chances of victory," in any particular case, an able leader may, perhaps, be more or less sure, but from them no mortal can ever eliminate that ultimate *uncertainty* with which the God of Wars turns the scale to suit other ends than those of earthly strategists. Whether, therefore, we call it Fate, or by any other name, it is above and beyond the domain of fixed science, and is ruled, no doubt, by similar laws to those which govern the gambler's die, when once that die is *cast*.

322. In an Advanced Game of war this uncertain but all-potent element must of course be fairly introduced, and in that of Strategos it is accomplished in the following manner: Table S gives, with more or less of accuracy, certain approximations to the "chances of success" which enter into the various circumstances that are continually recurring during action. These chances are given in the form of *ratios*; the table being similar in all respects to that (Table I) detailing the various ratios of possibility already considered, the remarks concerning that table generally applying also to this sub-

* See Foot-note, ¶ 273.

ject, and the same rule (IV) being likewise employed to determine the proper compound ratio of chances to use in any particular case.

323. These two subjects, though in fact very intimate and sometimes actually blending, are, for the purposes of analysis, always to be kept separated in the Advanced Study. Generally, however, no doubt as to their complete distinction will be entertained. For instance, there is a manifest difference between the consideration affecting the possibility of Infantry advancing over intermediate ground under hostile fire and its chances of success in the succeeding "final rush" or "hand-to-hand conflict." It is, therefore, especially for the purpose of providing a natural method of eventually determining the result of "the final rush," that this table is introduced and kept distinct from that of Possibility, strictly so understood.

324. The turn in which two hostile bodies will join in hand-to-hand conflict having arrived, the compound ratio (Rule IV) expressing the chances of success in the case will be determined, and will be employed in consulting the dice for two distinct purposes: *first*, to determine whether the result of the conflict shall be decided the same turn or not; and, *second*, to determine that result. Should the first decision of the dice be such as to favor a continuance of the conflict, the dice will be reconsulted the succeeding turn, and so on, until by them such a termination is called for; in no case, however, should this termination be delayed beyond five minutes from the commencement of the struggle. When the decision arrived at is such as to terminate the affair at any particular moment, the dice will be thrown again immediately to determine the result.

325. When consulting the dice to determine the *duration* of the conflict, Table J, Rule V, or Table K, Rule VI, may be employed, according as the ratio of chances applies to the one or the other, but, in order to determine the *result* of that conflict, another method of consulting the dice is to be resorted to, and will be fully explained hereafter, under the head of Table T.

Example I. Two Battalions of blue Cavalry, "not fresh," surprise and attack a red Regiment of Infantry, "fresh," and "in column." What are the "chances of success" in the case? Whom do they favor, and when shall the conflict be decided?

Numerically (see Note to Case 3) the chances favor blue 2 : 1; and, since they *surprise* the Infantry "in column" (see Case 4), blue is again favored

3 : 1. However (see Case 14), a ratio of 3 : 1 in favor of *red* must be introduced on account of the relative value (tactical, etc.) of the two "arms," and, finally, one of 4 : 3, also in favor of *red*, on account of "*freshness*" (see Case 2). Hence, applying Rule IV to obtain the compound ratio, we have :

Blue : Red :: $2 \times 3 \times 1 \times 3 : 1 \times 1 \times 3 \times 4 = 18 : 12$, or as 3 : 2 ; hence, the chances favor *blue* in this ratio.

In consulting such a ratio the first time, with a view to determining whether the conflict shall come to an immediate decision or not, a successful throw for the *offensive side* shall be regarded as calling for an *immediate decision*. In the case under consideration, let us suppose that the die, consulted according to Table J, shows : : . This favors blue, *the offensive*, and calls for a settlement of the conflict. The die is now to be reconsulted to determine the "Results and Consequences."

326. Let us take a rather more complicated case.

Example II. A Regiment of *red* Infantry, in column, which has within the past 5 minutes gained a victory, but is still "shaken," is attacked in front and flank by two Battalions of *blue* Cavalry, in line, and fresh. During the charge of the latter, however, a Battalion of *red* Cavalry, not perceived until about to strike, comes to the support of its own color, attacking *blue* Cavalry *in flank*, but encounters in its progress a difficult piece of ground, which badly shakes its organization. *What* are the "chances of success" in the compound case ? *Whom* do they favor, and *when* shall the matter be decided ?

An examination of the distances, etc., convinces the Referee that the two bodies of Cavalry will effect their shock at about the same moment ; he also decides that the attack of *blue* partakes of the nature of a "re-attack" upon the Infantry, while that of the *red* Cavalry is not only "a surprise," but such a one as the *blue* Cavalry will be powerless to prepare themselves to meet directly.

The consideration of the circumstances then results as follows :

First Phase of the Case.—From Case 10 we find that the re-attack by fresh Cavalry favors *blue* 2 : 1. So far as numerical strength is concerned (Case 3), before the *red* Cavalry comes upon the scene, the chances favor *blue* 2 : 1. The Infantry being in column and attacked by Cavalry (Case 14), a ratio of 3 : 1 favors *red* ; but this attack is in "front and flank" (Case 5), and therefore favors *blue* 4 : 1 ; and, the Infantry being "shaken"

while the Cavalry is "fresh," a ratio of 3 : 2 again favors *blue* (Case 6). Compounding these ratios, we obtain one of 8 : 1 in favor of *blue*.

Second Phase of the Combat.—But the second phase of the affair materially alters the case, as it naturally should.

As soon as the *red* Cavalry appears upon the scene, the numerical inequality (Case 3) disappears. We may, therefore, introduce a counter ratio of 2 : 1 on this account in favor of *red*. The attack of this body comes under Case 5, it being a "simple flank attack," which, by the note to that Case, gives the *red* a ratio of 4 : 1; the attack is, moreover, a "surprise" (Case 4), giving an additional ratio of 4 : 1 in favor of *red*.^{*} At the moment of "shock" the *red* Cavalry is in a "badly shaken" condition (Case 6), and must be disadvantaged by a ratio of 2 : 1 against it. Compounding these several ratios, we find *red's* chances of success in the second phase of the combat are 16 : 1, and, by compounding the ratios of both phases, we obtain a general one for the whole affair equal to 2 : 1 in *red's* favor.

327. To determine whether the result of the combat will be instantly known, consult Table J. Suppose $\ddot{\cdot}$ results, this favors *red*, the *offensive*, and the combat must end immediately.

328. Should it be preferable, the Referee may be allowed the sole decision as to the moment when the "results" of such an affair must be determined.[†]

329. To present the circumstances entering into this latter example in a more consolidated form, we may arrange them as follows :

First Phase.		Blue versus Red.	
Case 10, Table S.	Elementary ratio =	2	: 1
" 3, " "	" " =	2	: 1
" 14, " "	" " =	1	: 3
" 5, " "	" " =	4	: 1
" 6, " "	" " =	3	: 2
Compound ratio =		8	: 1

^{*} In fact, and according to the Referee's decision, the attack is such a one (see Note to Case 9, Table S) as the *blue* Cavalry can not meet, and, were the special circumstances of the case such as could not be analyzed, we might take the general ratio of 12 : 1, as there given, to cover such cases.

[†] However, some latitude should be given to the special circumstances in such a decision; for instance, in the complicated affair under consideration, the very nature of the case is such that it would probably be some moments before the actual issue would be known, and it is to suit just such considerations that we propose a double consideration of the ratio.

Second Phase.				Blue versus Red.	
Case 3, Table S.	Elementary ratio =	.....		1	: 2
“ 5, “ (Note)	“ “ =	.....		1	: 4
“ 4, “	“ “ =	.....		1	: 4
“ 6, “	“ “ =	.....		2	: 1
Compound ratio =				1	: 16
Final or general ratio therefore =				8	: 1
				1	: 16
=				1	: 2

13. DESCRIPTION AND METHOD OF EMPLOYING TABLE T, FOR DECIDING BY MEANS OF A SINGLE DIE UPON THE SUCCESS OR FAILURE OF A “FINAL RUSH” OR OF “HAND-TO-HAND CONFLICTS,” AND FOR METING OUT “RESULTS OF VICTORY” AND “CONSEQUENCES OF DEFEAT.”

330. An attack of any nature having been made, the “chances of success” having been calculated, and the moment for deciding its *result* having arrived, the Referee must be able to declare whether it is successful or not, and how much of success or failure is to be accorded to each of the contestants.

331. To render him some assistance in this important and most difficult task, as well as to lend special interest to this turning point of the game, is the object of Table T.

332. Its employment will be found particularly calculated to bring into prominence the *individuality* of the players, i. e., their powers of leadership, taxing their personal judgment, forethought, and self-reliance, and making a victory and its results, or a defeat and its consequences, depend, in a special degree, upon the way in which they may have handled their troops to increase their “chances of success,” and compelling them to improve these chances upon their own responsibility, and to keep them constantly in view up to the very latest moment of hope. The vital secret of some of the happiest examples of leadership found in history has consisted as much in forcing the most out of chances as in securing them originally.

333. It is at this stage of the game, particularly, that discussion and disputes tend to arise, and where, if left entirely to himself, the Referee will almost inevitably fail to satisfy all parties. It is too much to expect of any one that, in the midst of so complicated a study, his decision shall be above criticism, preserve those fine distinctions which the new circumstances

entering into every elementary combat require, and yet be made upon the spur of the moment. It is here in a special degree that this table will render valuable assistance in forming a *basis* upon which to work, and such a one as will bring into successive decisions that amount of *regularity*, tempered with difference, so desirable in the premises. Of course, wherever the table is ambiguous, the true interpretation of the result should be made by the Referee according to its *spirit*.

334. Upon battle-fields of the present day the deadly fire of improved arms is more than ever a prime factor in the determination of the general result. This fire tends continually to weaken the morale of both parties engaged, and to remove to ever-increasing distances that point from which the crucial effort of either is to be made. Nevertheless, though the actual *mêlée* is thereby rendered well-nigh impossible, this deadly fire does not prevent troops from "closing in" to those decisive distances from which the "*final rush*," as it is called in modern tactics, is to be made. It is toward this stage that every well-conducted attack continually progresses, and it is at or from this stage that the modern equivalent of the historic "hand-to-hand conflict" may be considered as taking place. This conflict is no longer necessarily one of actual, but is more generally of moral, contact. Table T, then, must be considered simply as preserving this well-known expression, i. e., the "hand-to-hand conflict," to indicate that period in the modern combat when the decisive action of an attacking party is taken, and the final impetus given. Thus, for instance, an infantry attack having steadily progressed up to within from 350 to 100 yards of its objective, the time for the "final rush" over the remaining ground has arrived, and Table T becomes applicable.

335. In the Campaign Game, battles become incidents of more or less importance, but their circumstances are no longer to be subjected to the same scrutiny we put upon the Advanced Battle Game. They are, rather, to be regarded as "hand-to-hand conflicts" between individual armies; the "chances of success," etc., of each contestant will be determined upon more general principles, and the final result may be arrived at by an appeal to Table T in the same manner as though the question merely concerned the settlement of one of the elementary contests of a general engagement. In this same connection, it may be stated that, throughout the conduct of Campaign Games, a system of generalization must be resorted to. In the

matter of losses, for instance, a method can be readily deduced from a consideration of the matter presented in Appendix F, Section XIV, under the head of "Loss in Battle," and similar methods obtained for other matters of consideration from historical study and comparison.

a. DESCRIPTION OF THE TABLE.

336. By looking along the top of Table T it will be noticed that its left-hand half is assigned to the Winning side, and enumerates the "Results of Victory," the right-hand half being given to the Losing side, and detailing the "Consequences of Defeat." It will also be seen upon closer examination that these results and consequences are still further analyzed so as to apply to both *offensive* and *defensive* victories and defeats. These results and consequences are severally graduated according to military importance, and are couched in terms familiar to the usual descriptions of victories and defeats of varying magnitude.

337. Along the top of each of the four large columns into which the table is thus divided, the several faces of a die are displayed, and arranged so as to decrease in regular order from left to right in each group. Beneath each face so displayed will be found the figures which indicate the losses per regiment and squadron engaged (i. e., when the *mélée* actually takes place, and for each minute of its duration). These losses are such as result from the use of the pistol, saber, and bayonet. Finally, in the central column, which divides the table into equal parts, will be found the several degrees of *preponderance in spots* which are liable to result from comparing any two throws of a single die. These several degrees are arranged so as to increase in regular order down the column, and opposite each of them will be found the corresponding results of victory and consequences of defeat.

b. PRINCIPLES UPON WHICH TABLE T IS BASED.

338. As the offensive side is not always victorious, nor a defensive side defeated, so, in the consideration of results and consequences, there may arise two different cases, according as either is a winner or loser.

339. *Cæteris paribus*, a defeat for an offensive side will result in a greater loss of life than one for a defensive side, and, conversely, a victory for the defensive should be less expensive than one for the offensive.

340. Since dice are taken as the means of decision, the better the throws, the less should be the loss for both winner and loser.

341. In the same connection, the greater the preponderance of spots in favor of one side or the other, the greater should be the accruing "results of victory," and the corresponding "consequences of defeat" for the other side.

342. As a tie may result from any one of six sets of throws, so there may be any one of six corresponding sets of losses assumed as due to such throws, these losses being least in case the tie is on sixes. In a similar way a preponderance of one (1) spot may result in but five ways, one of 2 in four ways, and so on down to a preponderance of five spots, which can result only when one side throws 6 and the other 1, thus (by ¶¶ 339, 340, 341) giving the maximum loss to the defeated side, and the minimum to the victor. This accords fully with the general experience of battles, defeats of minor importance resulting in many degrees of loss in life for both sides, while the more serious the defeat, as to importance, time required, etc., the greater and the less will be the corresponding losses, consequences, and results for the conquered and the victor. (Circumstances, of course, alter cases, and the Referee will decide in all exceptional ones.)

C. EMPLOYMENT OF TABLE.

343. To employ the table, we have the following :

Rule VIII. A single die will be thrown successively by each side with a view to securing the highest number of spots. Each player will be allowed as many throws as the compound ratio already determined assigns him "chances of success." As a general rule, such throws will be seen by himself and the Referee only. The offensive side will throw first. If a throw is unsatisfactory, and still other chances remain, it may be repeated. When, however, a new trial is made, the player forfeits all right to the results of preceding ones. The face of the final throw of each side decides the corresponding rate of losses in the *mêlée*, the *highest* number of spots indicates the winner, and the *excess* of spots determines "the results and consequences." When both players have made their throws, and the Referee has become fully satisfied of the state of the case, he will announce the result and superintend the changes called for.*

* Troops that are undergoing Results and Consequences must be suitably designated during the continuance of such a state of affairs. This will best be effected by *inverting* those that are suffering

d. NOTES ON TABLE T (RESULTS AND CONSEQUENCES).

344. 1. The Referee will decide in exceptional cases.

2. For each minute during which a pursuit follows an actual *mélée*, the defeated party loses as many men as it lost originally in the attack; the pursuers one sixth as many.

3. If a second line be in support, beaten cavalry are never to be considered as defeated by more than two spots; should, however, the second line itself follow up the attack, and be in turn defeated, such defeat will be reckoned by the full number of spots thrown in excess, subject, however, to the restrictions contained in the following Note.

4. In the consultation of Table T, the weight of the *original odds* (as expressed in the general ratio of chances used in any particular case) must be allowed to have due influence upon the character and amount of the resulting victory or defeat. With a view to satisfying this consideration, the results and consequences therein tabulated must ordinarily (Referee) be "scaled" upon the following basis:

the more serious consequences of defeat, and marking against them, and against such as are reaping the results of victory, such brief notes or signs, upon the slated theatre of war, or upon the slated pieces themselves, as shall facilitate future references.

In this connection it may be remarked that, whenever the importance of a game or study will justify the use of a *recorder*, such services will greatly expedite the conduct of a complicated investigation. In this way, also, a most valuable collection of *notes* upon the various problems in *troop-leading* may be gradually collected.

In the application of Table T to the complicated cases that will constantly arise in this study, the reduced ratio of "chances of success" will seldom be a very simple one, and will frequently, perhaps, fail to reduce at all to low terms. It may, for instance, come out 12:1, 9:2, 7:5, etc. There are, then, several methods of procedure, either one of which may be followed in such cases:

1st. The general rule (VIII) just given may be followed, in which case each side has as many throws as the ratio gives him chances.

2d. Approximations may be freely resorted to, as in case the ratios were 9:2 or 7:5, etc., which ratios may be regarded as 4:1 and 3:2, etc.

3d. Table K may be directly consulted under the proper ratio following Rule VI, and the result applied to Table T, as follows: The winner will always be regarded as having thrown a six spot; the loser will then take two or three dice (according to the number employed in deciding the ratio), and with them make one throw; a *mean* of this throw shall be taken and regarded as that of the loser (should such a mean also be six spots, it will be diminished by one spot). With these two results, Table T may now be consulted. Suppose, for example, the ratio was 31:1 in favor of Blue, then, according to Rule VI for applying Table K, two dice must be thrown once in search of the combination of two aces; the throw is made and fails. Blue therefore wins, and is to be regarded as having thrown ::. Red now throws with two dice, obtaining, let us suppose :: + :: = 8, the mean of which is 4; hence, the final result of such a method is 6:4 in favor of blue, who thus has a preponderance of two spots.

Each of the above methods has its merits and demerits; the first is, upon the whole, the most preferable, though the matter is left entirely with the Referee for selection according to circumstances.

A <i>defeated</i> side whose original odds were greater than	12 : 1	{ Can never be regarded as defeated by more than a <i>tie</i> .
A <i>defeated</i> side with original odds in its favor of..	12 : 1 to 5 : 1	{ Can never be regarded as defeated by more than (.) one spot.
A <i>defeated</i> side with original odds in its favor of..	4 : 1 to 2 : 1	{ Can never be regarded as defeated by more than (. ') two spots.
A side whose odds originally were.....	3 : 2 even 2 : 3	{ Will not be allowed to employ a greater "excess" than (. ' ') three spots.
A <i>victorious</i> side with original odds in its favor of.	2 : 1 to 4 : 1	{ Will not be allowed to employ a greater "excess" than (: :) four spots.
A <i>victorious</i> side with original odds in its favor of.	5 : 1 to 12 : 1	{ Will be allowed the full latitude of the table.
A <i>victorious</i> side with original odds in its favor greater than	12 : 1	{ Will always be regarded as so victorious by at least (. ') two spots.*

5. See Notes to Cases 9, 11, 14, 15, 16, 17, 18, 19, and 23, Table S, and 17, 18, 19, 24, 25, and 31, Table I, relative to cavalry charges and special attacks.

Example I. As an example of the application of this table, let us continue the consideration of the first one given under Table S. In this example the moment of termination has arrived, the *mêlée* is in progress, and the questions now to be determined are, Who is victorious? and What are the re-

* The modification contained in Note 4 to Table T is introduced with a view to eliminate the weight of the mathematical criticism which will, perhaps, be urged by some against this method of consulting the die. It will secure to the player originally favored a due amount of security against an accidental disaster. It is believed, however, that, in spite of the mathematical consideration involved, the method proposed will be more satisfactory to the majority of players than one in which the whole ratio is decided by a single throw. The majority of players certainly *feel* (and this is a strong point in favor of any method of deciding probabilities) that an excess of throws represents a corresponding excess of odds to get a high number, and thus obtain greater results, or, at least, secure one's self against serious consequences. It is believed, too, that the *personality* thereby introduced into the play more than compensates for any irregularity in the method. Should, however, players see fit to sacrifice this personality to the desire for still greater accuracy, the dice may be consulted directly by the Referee according to the methods indicated in Tables J and K, and decide at once the success or failure of the attempt (final rush, etc.) under consideration. The number of points of excess may then be determined by allowing the winner a single throw of a die (: : spot being considered as blank). The number thrown may thus be taken as indicative of the excess, and Table T, as modified by Note 4, will still be applicable.

sults and consequences ? The chances stand 3 : 2 in favor of *blue*. Hence, following Rule VIII, Blue is entitled to *three* throws and Red to *two*, and, since Blue is acting upon the *offensive*, he will throw first. Taking, therefore, a single die, he throws it once ; suppose an ace turns up, he naturally tries again, and this time let it be $\cdot\cdot$. Considering this throw as high enough to secure himself against serious consequences should he fail to be the victor, and unwilling to risk his remaining chance, he retains this throw as final. Red now throws, the die coming up $\cdot\cdot$ the first time, which is retained. Neither player is supposed to be acquainted with the throw of the other.

The Referee now satisfies himself whether the table applies directly, and at length announces as follows : “ *The result of the throw is 5 : 4 in favor of red, who therefore wins by one spot ; blue will retire at a gallop until he finds cover or support.* ” Under this decision the table is examined, when it will be found that a victor upon the defensive side throwing $\cdot\cdot$ loses 0 per hostile squadron, while a defeated offensive side throwing $\cdot\cdot$ loses 11 men per hostile regiment : the losses are, therefore, at the rate of 0 for red and 11 for blue *per minute*. But the conflict under consideration was decided to end immediately, so, allowing but a few moments for the *mêlée*, say $\frac{1}{4}$ of a minute, to the few *blue* Cavalry that succeed in joining in hand-to-hand conflict with red, we have their losses at 3 men. The “Consequences” of Blue’s defeat are to be found in the column of the Defeated side headed “Offensive,” and opposite to \cdot in the column of Excess, which reads as follows : “ *A Repulse, troops badly shaken and driven back, may not renew the attack for 10 minutes.* ” Note 5, Table T, however, applies, and refers to Cases 14 and 15, Table S, where it will be found provided that defeated Cavalry must gallop in retreat directly to its rear for “cover,” etc.

The “Results” for Red are found upon the opposite side of the table, in the column headed “Defensive,” and are as follows : “ *A decided advantage, the attack gallantly repelled, but troops somewhat shaken, may not assume the offensive for 10 minutes.* ”

CHAPTER III.

SPECIAL RULES FOR CONDUCTING THE ADVANCED GAME.

345. The decision of the Referee will in all cases be final, and should not be questioned. He should, however, generally conform to the rules and methods herein given, and, whenever for good cause he differs therefrom, he should give his reasons.*

346. No disputes will be allowed in the game room, and all communications during playing-hours will be limited to what is absolutely necessary.

347. Spectators will, of course, be governed by the ordinary rules of game etiquette, and, unless appealed to by the Referee, avoid all interference in the run of affairs.

348. It shall always be considered as highly improper for the players upon the same side to consult each other, outside the game room, upon the plan, procedure, or incidents of the game after it has once begun, and until it shall have been declared finished ; provided always such restriction shall not be regarded as limiting outside discussion upon parts of the game already completed, or preventing such discussions as are invited by the Referee himself.

* The skillful exercise of the important office of Referee requires not only a special aptitude, but it is indispensable that he, of all others, should be thoroughly familiar with the principles and methods of the Game. Referee decisions are generally premature, a tendency which must be carefully guarded against. To derive the most good from such a study, the office of Referee should be regarded, not so much in the light of an adviser, as of an *arbiter*. He should bear in mind the principle that *anything can be attempted*. The *advisability* of an attempt is another thing, and one that it is the object of the War Game to make evident to all concerned by results. The Referee, therefore, should generally require a *positive statement of intention*, as the *basis* of his decision ; the attempt must be *willed* into operation by the player. It is not until then that the Referee may properly exercise his functions. He may then duly consider all the pros and cons. Losses, Tactical, Strategical, Topographical, and Accidental Difficulties, etc., must be calculated and examined, and, the crucial moment having in due time arrived, as indicated by the circumstances of the particular case, he should make his decision, and, if desirable, state his reasons, which, however, etiquette must protect from dispute.

349. No communication is allowed between parties of opposing sides, except under flags of truce, etc., sent in due form, and such communications shall be made beyond the hearing of all save the parties immediately concerned.

350. Communication between parties of the same side will be regulated as in actual service: if the parties are at the same point, it is allowable, and must be brief; if they are upon different parts of the field or campaign theatre, such communications must be sent by messengers, aids, field telegraph, etc. These messages, orders, etc., must be written, and concise, and due regard must be paid in their transmission to the actual distances, and thus to the time necessary for their transit. The Referee will in all cases be the medium of such communications, and, after they have been transmitted and executed, they shall be returned and filed with him for future reference.

351. During the game, the various pieces will be moved by the day, hour, period, or minute, according to their several distances apart, and from the central scene of action.

1. TABLE Y, DETERMINATION OF GAME INTERVALS.

1. Troops over 30 miles from the scene of action move by the *day*.
2. Troops over 3 and under 30 miles from the scene of action move by the *hour*.
3. Troops over 1 and under 3 miles from the scene of action move by the *period* (5 minutes). Troops less than 1 mile apart move by the *minute*.*

* The Referee decides upon the length of time to be comprehended in the playing of the particular game under consideration, and will divide it into days, hours, periods, and minutes, according to circumstances, each division being regarded as a *Game interval* (i. e., turn). As a general rule, the interval should be regulated by the proximity of the closest opposing bodies, these moving, for instance, by the minute, if within the sphere of possible action; pieces beyond this distance and within three miles of each other making but one move (i. e., by the period) to five of the former, etc. Players desiring to make use of a minute or other interval with reference to pieces not usually so moving, may do so by signifying it to the Referee; indeed, there is no objection to employing even the minute interval to the exclusion of all others, except that it effects a greater saving of time to move the more distant pieces by longer intervals only, the moves becoming more frequent as the distances diminish. When several intervals are being considered in the same game, a *period* should always be announced by the Referee after each set of five "minute intervals," it being regarded as covering the same time, and being available only to pieces from 1 to 3 miles from the scene of action, and which have not made use of the shorter intervals. In the same manner, hour and day intervals are to be declared in order. Table B will be found conveniently arranged for this purpose.

4. Hostile troops within 2 miles of each other may or may not be regarded as within *sight*, according to the decision of the Referee, he being governed by the topography of the theatre, and by the manner in which such bodies come into and leave such positions. This rule also applies to troops upon the same side. Troops may thus gain and lose sight of each other. •

352. Knowledge of the presence of such bodies of troops (hostile or friendly) as may be in the vicinity will be presumed or not, according to similar rules.

353. Under the guise of *information*, such as is usually to be derived from prisoners, deserters, spies, people of the country, newspaper reports, rumors, etc., the Referee should more or less frequently convey odd bits of intelligence to each side. This information may be reliable or not, according to circumstances, should be generally in writing for future reference, and, in conveying it, the Referee should govern himself by the well-known experience of war, imparting only such matters as usually become known through the medium employed, and favoring either side as little as possible.

354. Pieces representing minor tactical divisions (i. e., companies, platoons, sections, etc.) may be obtained from the Referee in exchange for the regular ones. Such pieces must be suitably designated by the Referee.

355. Messengers, scouts, individual officers, etc., may likewise be issued by him as desired, and returned if not captured, after completing their several duties. Such messengers, etc., will usually be represented by round slated counters, properly designated and located.

356. When a line or body of troops has become so depleted by hostile fire as to be unable to continue its advance, or maintain its position, the Referee may order its retreat, and impose reasonable consequences, based upon similar circumstances in actual service (see ¶ 270).

357. Captured Field-pieces, Stores, Baggage, etc., may or may not be used by the captors, according to the nature of the case (Referee).

358. As a general rule, each player must claim for himself all points which will improve his own possibilities or chances, or better the "effect" of his fire. In large games, the Umpire upon each side may also make such claims. Players may also point out, as against each other, such circumstances as tend to diminish the chances of their adversaries. This ruling

will not, however, debar the Referee from introducing such important ratios as may have been overlooked, imposing additional ones, etc.

359. All such doubtful points as may be properly so decided shall be settled by an appeal to the dice under a suitable ratio, the parties throwing the dice in a manner similar to that laid down under applicable rules and tables.

360. If *firing* is to commence at a certain time, the Referee must be so informed, as, otherwise, it will not be taken for granted.

361. For similar reasons, *charges* of Infantry and Cavalry contemplated in a move should be indicated to the Referee, who, according to circumstances, will notify the other side, the Referee being governed in all such matters by his judgment as to whether in actual affairs such and such movements would be anticipated, a surprise, or perceived in operation.

362. So, likewise, the rates of march at which a player desires particular bodies of troops to move, the roads over which they are to go, and the tactical formation in which they will move, the object of a manœuvre, attack, disposition, etc., must always be stated to the Referee and his proper assistants. This, for obvious reasons, will best be done in writing, in order that all the successive steps of the game may be fully understood by the Referee, and properly weighed and considered by him both before their initiation and during their progress.

2. GAME RATIO.

363. A general record of the "play" of each side may be kept in several ways, and will be found interesting as an indication of the best management as to manœuvres, power of concentration, seizure of opportunities, etc. Where no special accuracy is sought, these records may be conveniently kept upon the markers and counters used in the Battle Game, and already there described. Among the simplest methods that suggest themselves are the following :

1. As often as the dice are consulted to settle a *ratio*, whether of possibility or chance, etc., each side may score upon its marker as many points as its own term indicates. Thus, if a ratio be 5 : 3 in favor of blue, blue may score 5 points and red 3. Should the ratio be 6 : 1 in favor of red, red will score 6 and blue 1, and so on.

2. Record may be kept of the *excess* only, which will be found by subtracting the lesser term of the ratio from the greater. Thus, the ratio being

5 : 3 in favor of blue, this side has the excess, and will score $(5-3) \ 2$ upon its marker. Were the ratio 6 : 1 in favor of red, the excess $(6-1) \ 5$ will be scored by red, and so on.

3. The most accurate method will be to employ each term of the ratio as a *factor*, and to multiply thereby all previous scores made by the corresponding side, keeping the general Game ratio, thus obtained, reduced within convenient limits. For instance, blue having already scored 20 and red 8, let us suppose the new ratio to be 5 : 3 in favor of blue ; then blue's score will be $(20 \times 5) \ 100$, and that of red $(8 \times 3) \ 24$, or, if a reduction be made to the simplest terms, blue's score will be 25 and that of red 6, the Game ratio being 25 : 6 ; and, if now a new ratio of 6 : 1 in favor of red be considered, the scores will stand 25 : 36 in favor of red, no further reduction being possible, etc.

Such indications, taken in connection with losses, captures, the final dispositions, etc., will go very far toward settling conclusively the otherwise difficult question of final victory and defeat.

364. With reference to the value of such a *record of play*, it should be noticed that all of the elements which go toward the general result do not enter it in reality with the same value. In the long run, however, it is fairly to be presumed that the balances in this respect will be very evenly struck. Of course, the more we itemize this record, the greater is the degree of accuracy with which we approach the desired end. Thus, by keeping *separated* records of Possibilities and Chances, we make a nearer approximation to the index sought. This will become still closer if we discriminate between those ratios which are the result of deliberate strategic combination and those which merely enter as modifiers, due to accidents of topography, etc. In fact, the same remarks apply equally well to all the records kept in such a study. Take, for instance, those of *losses*. For sheer convenience, in foreign systems, they are forced to keep them simply in a general form (as by Table W). But here, above all other places, we should discriminate, as we are enabled to do with stated pieces, not only between the casualties due to various weapons, but even down to the losses incurred by each unit exposed to fire. In the small Detachment Game, this, to some extent, may be, and is, attempted in foreign systems ; but, from the very labor involved, becomes almost impossible in more extended ones. It will thus be seen that, as a general rule, covering the whole subject of *rec-*

ords as indicators of “play” and “results,” we must itemize whenever we are in search of the specific, and can afford to generalize only when the subject enters the study merely as incidental thereto.

365. In Table U we give a form suitable for the keeping of such a Game Ratio in an itemized shape. This record may be kept by each side independently, though, by entering therein all the elementary ratios in the same order—as, for instance, *Red versus Blue*—one such record will suffice for the whole game. The several ratios therein recorded are the ones to be found in the various cases cited as examples under Tables I and S.

CHAPTER IV.

*METHOD OF CONDUCTING THE ADVANCED GAME.**

366. A Referee is first agreed upon by the players.

367. Two other players then choose sides, making their selections alternately from the remaining players; and, if possible, the Referee is allowed one or two assistants, who may also act in the capacity of Umpires and advisers, always, however, subordinate to the Referee.

368. The Referee now decides upon some military problem, such as the conduct and defense of a siege, the advance upon and protection of some strategic point, a campaign, battle, skirmish, etc. This is published in general terms to all the players.

369. He likewise prepares for the Commander-in-chief of each side a set of written instructions, giving the number, character, and original disposition of his forces, setting forth in concise terms the object he is to strive for, and giving such general or special information concerning the other side as may not already have been expressed in the terms of the general problem, and as he may think proper to impart. These instructions are separately sealed up in envelopes, and given in charge of the assistants.†

* See Appendix D.

† It is here desirable to impress upon students of the Advanced Game the perfect freedom in which they are left to apply its rules, suggestions, and principles. An almost endless number of *distinct studies* is opened to them, commencing with the simplest general problem of strategy, and extending thence downward to a consideration of the smallest details (from the preliminaries to the conclusion) of some decisive general engagement. Abroad, this study has been very naturally divided into several, so-called, distinct games: the Strategic Game, the Grand Tactical Game, the Siege Game (see ¶ 238), and the Minor Tactical or Detachment Game. They are all, however, simply special applications of the same general principles; in each of them, some one or more of the elements of military science are most carefully examined, as, for instance, in the Grand Tactical Game, the disposition of troops upon the field, the manœuvring of large masses, marches before and after battle, etc.—while the others, though not entirely overlooked, are, for the time, assumed upon general principles. In the case cited (Grand Tactical Game), a game results in which those peculiar studies which exercise

370. The game may be played upon one, two, or three maps—preferably upon three—in which case, each side has one, the third being for the use of the Referee. When, however, but one or two maps are employed, the game must be modified to suit such circumstances. These maps should be drawn to a large scale, and should be placed upon tables and completely screened from each other, or even in separate rooms, wherever possible. They must exactly correspond, and should show all the military features of the theatre under consideration.*

the General officer alone are considered, and whose termination is indicated by the completion of the dispositions, etc., called for by the problem.

In a similar way, every "special operation of war" can have its own game, as, for instance, a Convoy Game, a Game of the Advanced Guards, an Out-post Game, a City, Mob, or Street-fight Game, etc., the special rules of which will come directly from the character of the prototype, while the same general method of using the tables, rules, etc., given in this volume, will apply, subject only to such simple alterations as the nature of the special case in the opinion of the Referee may demand.

Among all of these studies, however, that of the Detachment Game—so called from its usually requiring a smaller number of troops to be represented upon the map—will, perhaps, afford the most interest, and impart the most valuable and necessary information to the average player. It is a *short* game, can be played by a *few* (3 or 5, etc.), requires but little previous study, and yet tests, exercises, and develops the most important elementary faculties requisite for effective troop-leading, and its problems should certainly be thoroughly mastered before a more complicated study is attempted. At West Point (where the original Kriegsspiel has for some time been studied), two classes of Detachment Games have been very happily designated as "Mischief Games" and "Information Games." In the former, the opposing forces are placed at the outset more or less closely within range, and most of the manoeuvring thus takes place under fire. This game involves the special study of *casualties*, familiarizes the player with the "tactical use of the three arms," their relative importance and effectiveness, their combined use, etc. In the "Information Game," on the other hand, the hostile forces are placed, at the beginning, sufficiently far apart to require nearly all the time ordinarily devoted to a single game in simply getting into action. This game gives opportunity for valuable study of the means of gathering information and using it, of seizing advantages, and disposing troops under stress of time. It also exercises the players in rapidly forming and altering battle plans, etc. Of course, the two games may be *combined*; a longer one thus results. The "Information Game" of to-day may be continued, and thus become a "Mischief Game" to-morrow, allowing of the consecutive study of that which is the practical experience of war. It is in this general way that the players themselves should originate games and studies, and in such a broad field the interest of the professional soldier need never flag. For further valuable advice upon this point, the student is referred to Captain Charles N. Raymond's entertaining articles upon the "War Game," in the "Field-Glass for 1879."

As a most valuable companion and assistant in such studies, the author also begs permission to recommend Colonel I. von Verdy du Vernois's "Studies in Troop-leading," translated by H. I. T. Hildyard, Adjutant 71st Highland Light Infantry, and published by Henry S. King & Co., 65 Cornhill, London, 1872. One of these studies (of which several of special importance to the student of war upon the map have now appeared) is a printed record and discussion of the orders, moves, and results of an imaginary advance upon, and expulsion of the enemy from, Trautenberg, accompanied by maps and diagrams, and intended to be studied rather than read, and "worked out with compasses, paper, and pencil." The private student of strategy will find these studies of incalculable value.

* As already stated, 5 or 10 inches to the mile will best suit the capacity of the outfit. However, as the study becomes more instructive and entertaining as we lessen its scope and enlarge the scale, any convenient multiple of 5" may be employed. With a map on a 25" scale, such as the latest Ordnance Surveys of England, a regiment will be represented by five line pieces, each of which thus becomes a "division," and those minor details which are so valuable in the Detachment Game come into

371. The Commanders-in-Chief will next throw dice for the choice of the envelopes containing the special instructions. The choice having been made, the envelopes will be quietly opened behind the proper screens, and the various dispositions required therein carefully effected by the assistants under the supervision of the Referee.

372. Each commander will have upon his map only such pieces as represent his own troops, these being drawn from the Referee as needed.

373. The Referee, however, will have both armies in all their dispositions fully represented upon his own map.

374. The Commanders-in-Chief will now mature their plans, consulting, if desirable, with such of their subordinates as are regarded as being at Headquarters. Their plans being completed, they will issue such orders as are requisite to put them in operation, specifying changes, advances, etc. These orders, or such of them as pertain to the day under consideration, etc., will be transmitted to the Referee, who will rearrange the troops upon his own map to suit them, due regard being paid to distance, time, and other necessary considerations.

375. The Referee now returns, or transmits to the various players such orders as pertain to them, and the proper redispositions called for therein are made by the assistants.

376. These various preliminaries having been completed, each map should fully represent the initial steps taken toward solving the problem, as viewed from its own special standpoint, and the game proper may be considered as ready to commence.

377. The playing of a single Advanced Game will extend over one or several meetings of the players, according to its magnitude and nature. It may, for instance, occupy several months and numerous sessions, or, perhaps, require but one meeting to complete it. When several sessions are necessary, each one will be devoted to the study of such events as may transpire in a definite portion of time, which, together with the number of intervals ("turns") into which he intends to divide it, should be announced by the Referee at the close of the previous session. (See Appendix D.)

greater prominence. When but one map is employed, slips of colored paper (blue and red), held in place by small weights, so as to conceal parts of the map here and there, will answer very well for screens, and the players may come into and retire from the room alternately to conduct the game, the Umpires remaining or not to assist the Referee, according to circumstances. (See, also, the remarks on jointed screens in foot-note on page 8.)

378. A campaign, studied simply as such, will generally result in a short game, because its progress, usually determined by the day, is rapid, and entails little if any after-calculation, and each important step is instantly appreciated. The several battles which may occur during such a study should be regarded merely as more or less important *incidents* thereto, and their results and consequences be determined by an appeal to the die under a suitable general ratio of chances. On the other hand, a battle, as such, studied by the advanced method, will take fully as long a time upon the map as it would upon the field itself, or more often many times as long, if its moves are all by the minute, and properly analyzed and studied. As a battle waxes hotter, its numerous attacks and counter-attacks, although simultaneous upon the field, and, as it were, self-regulating, must be successively made and studied upon the map, a process which in some cases will certainly require considerable time.

379. Upon the day appointed for playing, everything being in readiness, the Referee will *call* the game, and give notice that an interval is to be played, announcing it as a day, hour, period, or minute, according to circumstances. Table A gives the Order of Procedure for playing such an interval.

380. In all movements of troops in campaigning, Table E will be the basis of calculation ; when, however, they come within “feeling distance” of hostile bodies, and upon the Field of Battle, Table F will constitute such basis.

381. As the proximity of the hostile bodies brings the various advanced detachments within sight of each other, the Referee will cause his assistants to place representative pieces of the opposing forces upon each player’s map, and thus, as the game continues, additional pieces will be located, until, at length, more or less of the opposing armies comes into each other’s view.

382. Each player will be represented by name upon a slated piece (Fig. 13, Plate II) placed upon the map, and indicating *where* he is supposed to be at any given moment, and such players can take no advantage of indications of hostile parties, until such time as information could really be communicated to him, and his supposed intermediate generals, by such ordinary means as are actually employed in service. For instance, proper information, as by a mounted orderly, conveyed to the rear from the advanced detachments that first “feel” the enemy, may be regarded as justifying the proper

player in making such dispositions, etc., as he would were he actually in command of the various minor bodies through which the information progressively passes rearward ; and no movements already under way may be checked, altered, or otherwise directed save by a similar means, due regard being always paid to actual *distance* and requisite *time*.

383. If the number of players furnishes a commander for each of the subdivisions, the hostile pieces, etc., are shown on the map to that player only from whose position they can be seen, and the information given by the Referee successively to the higher commanders at the proper times as determined by the rate of travel of a courier, etc. If only the highest commander be present, the details and minor dispositions may be intrusted to the Referee and his assistants, who will effect them according to general principles.*

384. In the same connection, general orders, growing out of such an ascertained knowledge of the enemy's proximity, may not emanate from the Headquarters of an army until the information could actually have reached there ; and such orders must in a similar manner occupy due time in reaching from thence the various corps, divisions, etc., concerned.

385. The Referee, assisted by his own subordinates, must, in the mean time, notice the run of affairs, bringing to bear upon the various rapidly multiplying incidents all the knowledge, judgment, and experience he can. It will thus be seen that upon the Referee, in particular, will depend the successful realization of very much of the vast amount of interest and information which may be derived from a study so comprehensive. And it should, of course, be needless to state that the players themselves should enter into the *spirit* of the game, and supplement to their utmost every effort of the Referee to perform his arduous duties.

386. Valuable tables and statistics will be found in the Appendices, which, until better authorities can be consulted, and properly collated, should govern decisions in all applicable cases. In this connection, it should be stated that the various parties to the game should search all authorities within reach for facts and data with which to pursue the study of the Advanced Game in such a spirit as to make Strategos a reliable teacher of leadership. The various data so collated should always be kept, and finally tabulated for

* When the game is employed to elucidate Military History, an assumed omnipresence of the student may be an advantage, but should be hardly allowed to the commander of an original campaign or battle, except as absolutely subjected to the elements of *time* and *distance*.

use under similar circumstances in future games. In this way, important decisions upon such questions as constantly arise will be rapidly amassed, the simple reading of which will be a vast benefit to students of military science.

387. But how shall the Advanced Game terminate? and what shall constitute a victory or a defeat? To these important questions it may be answered that, as *discretion* should and usually does terminate a real battle, so, more or less, it should decide the end of such a study. One side gains such a manifest advantage nearly always in actual battles that the other soon *sees* it, and hastily acknowledges defeat by seizing the earliest moment to retire, and thus avert more serious disaster. Indeed, the faculty promptly to realize such a state of affairs, and instantly to act upon it, constitutes in itself an important feature of generalship. So, in the Advanced Game, it is expected that such a manifest success gained by either party, as, upon the broader field of battle, would have necessitated his opponent's defeat, and perhaps his ruin, unless retreat were put in order, shall decide the victory; for instance, a flank may be clearly turned, a line badly broken throughout its whole extent or disastrously so in some important locality, etc. Any such result should cause a graceful admission of defeat, while a doubtful game may be drawn or else left to the decision of the Referee.

APPENDICES.

APPENDIX A.

INSIGNIA OF RANK IN UNITED STATES SERVICE.

Selections from General Orders No. 92, War Department, A. G. O., Washington, D. C., October 26, 1872, and its Subsequent Modifications as expressed in Orders as late as June 29, 1880, relative to Insignia of Rank in the United States Army.

FORAGE-CAP BADGES.

For General Officers: A gold embroidered wreath on dark-blue cloth ground, encircling the letters "U. S." in silver, old English characters.

For Officers of the General Staff and Staff Corps: Same as for General Officers, with the exception of those for Officers of the Adjutant General's Department and for Ordnance Officers. The cap ornament for Officers of the Adjutant General's Department will be a solid silver shield bearing thirteen stars; for Ordnance Officers, a gold embroidered shell and flame on dark-blue cloth ground.

For Officers of Engineers: A gold embroidered wreath of laurel and palm encircling a silver turreted castle on dark-blue cloth ground.

For Officers of Cavalry: Two gold embroidered sabers, crossed, edges upward, on dark-blue cloth ground, with the number of the regiment in silver in the upper angle.

For Officers of Artillery: Two gold embroidered cannons, crossed on dark-blue cloth ground, with the number of the regiment in silver at the intersection of the crossed cannon.

For Officers of Infantry: Two gold embroidered rifles without bayonets, barrels upward, on dark-blue cloth ground, with the number of the regiment in silver in the upper angle according to pattern in Quartermaster General's Office.

For Officers of the Signal Service: The distinctive insignia on the cap will be according to the pattern deposited in the office of the Chief Signal Officer.

For Light Artillery and Cavalry Soldiers: The numbers of their regiments in the upper, and the letters of their companies in the lower, angles of the badges of their respective arms upon the forage caps.

For Ordnance Sergeants and Soldiers: The "shell and flame" on dress and forage caps.

For Hospital Stewards: The letters "U. S." in white metal, inclosed by wreath, on dress and forage caps.

For Commissary Sergeants: Crescent in white metal, the points in a vertical line, on dress and forage caps.

For Engineers: The castle, with letter of company above it, on dress and forage caps.

For Artillery: The crossed cannons, with number of the regiment in upper, and letter of company in lower, angles on dress and forage caps.

For Infantry: The crossed rifles, with the numbers of regiment and the letters of company placed as for Artillery, upon dress and forage caps.

For Field and Band Musicians: Bugle, with numbers of regiment in the center, and the letters of the company above the bugle.

The Cap Trimmings for enlisted men of all arms and corps will be of yellow metal, unless otherwise specified.

PLUMES FOR OFFICERS.

For General-in-Chief: Three black ostrich feathers. For other General Officers, for Officers of the General Staff, and Staff Corps: Two black ostrich feathers.

For Regimental Officers of Foot Artillery and Infantry: Of cocks' feathers, to rise five inches above the top of the cap, front feathers to reach the vizor, rear feathers to reach the top of the cap, with gilt ball and socket; color of plume to be red for Artillery and white for Infantry.

For Officers of Light Artillery and Cavalry: Horse-hair plume, gilt ball and socket; plume to be long enough to reach the front edge of the vizor of the helmet; color of the plume to be red for Light Artillery and yellow for Cavalry.

PLUMES AND POMPONS FOR ENLISTED MEN.

For Artillery: Red pompon, pattern shape; ball and socket of yellow metal.

For Infantry: White pompon, same shape and with same ball and socket as for Artillery.

For Ordnance: Crimson pompon, same ball and socket as for Artillery.

For Engineer Troops: Red pompon, with white top; same ball and socket as for Artillery.

For Light Artillery: Red; and for Cavalry, yellow horse-hair plume, same size and length as for officers; socket according to pattern.

EPAULETS.

For the General of the Army: Of gold, with solid crescent; device, two silver embroidered stars, with five rays each, one and one-half inches in diameter, and the "Arms of the United States" embroidered in gold placed between them.

For a Lieutenant General: Three silver embroidered stars of five rays, each respectively, one and one half, one and one quarter, and one and one eighth inches in diameter; the largest placed in the center of the crescent; the others, placed longitudinally on the strap and equidistant, ranging in order of size from the crescent.

For Major General: Same as for a Lieutenant General, omitting smallest star, and the smaller of the two remaining stars placed in the center of the strap.

For a Brigadier General: Same as for a Lieutenant General, omitting all but the largest star.

SHOULDER-KNOTS.

For Officers of the Adjutant General's and Inspector General's Departments, and for Aides-de-Camp to General Officers: Of gold cord, Russian pattern, on dark-blue cloth ground; insignia of rank and letters of corps or designation of regiment embroidered on the cloth ground, according to pattern; an aiguillette of gold cord to be worn with the right shoulder-knot and permanently attached thereto, according to pattern; save that the insignia upon the shoulder-knots for Officers of the Adjutant General's Department, Corps of Engineers, and the Ordnance Department shall be a solid shield of silver, bearing thirteen stars, according to pattern, a silver turreted castle of metal, and a shell and flame in silver embroidery, respectively.*

For Officers of other Staff Corps: Same as above described, without the aiguillette; those of the Signal Service being according to pattern deposited with the Chief Signal Officer.

For Officers of Cavalry, Artillery, and Infantry: Of the same pattern as for the Staff Corps, but on cloth of the same color as the facings of their arm, with insignia of rank and number of regiment embroidered on the cloth ground, according to pattern.

For Regimental Adjutants: Of the same pattern as for other officers of their arm, but with aiguillettes attached.

INSIGNIA OF RANK ON SHOULDER-KNOTS.

For a Colonel: A silver embroidered eagle at the center of the pad.

For a Lieutenant Colonel: Two silver embroidered leaves, one at each end of pad.

For a Major: Two gold embroidered leaves, one at each end of pad.

For a Captain: Two silver embroidered bars at each end of pad.

For a First Lieutenant: One silver embroidered bar at each end of pad.

For a Second Lieutenant: Plain.

For an Additional Second Lieutenant: Same as Second Lieutenant. The above insignia to be the same as prescribed for the shoulder-straps.

SHOULDER-STRAPS.

For the General of the Army: Dark-blue cloth, one and three eighths inches wide by four inches long, bordered with an embroidery of gold one fourth of an inch wide; two silver embroidered stars of five rays each, and gold embroidered "Arms of the United States" between them.

For a Lieutenant General: The same as for the General, except that there will be three silver embroidered stars of five rays, one star on the center of the strap, and one on each side, equidistant between the center and outer edge of the strap, the center star to be the largest.

For all Major Generals: The same as for the Lieutenant General, except that there will be two stars instead of three; the center of each star to be one inch from the outer edge of the gold embroidery on the ends of the strap; both stars of the same size.

* For an Assistant Adjutant General with the rank of Colonel, the shield will be worn on the bullion of the knot, midway between the upper fastening and the pad.

For a Brigadier General: The same as for a Major General, except that there will be one star instead of two; the center of the star to be equidistant from the outer edge of the embroidery on the ends of the strap.

For a Colonel: The same size as for a Major General, and bordered in like manner with an embroidery of gold; a silver embroidered spread eagle on the center of the strap, two inches between the tips of the wings, having in the right talon an olive branch, and in the left a bundle of arrows; an escutcheon on the breast, as represented in the "Arms of the United States." Cloth of the strap as follows: for the General Staff and Staff Corps, dark blue; Artillery, scarlet; Infantry, sky-blue; Cavalry, yellow.

For a Lieutenant-Colonel: The same as for a Colonel, according to corps, omitting the eagle, and introducing a silver embroidered leaf at each end, each leaf extending seven eighths of an inch from the end border of the strap.

For a Major: The same as for a Colonel, according to corps, omitting the eagle, and introducing a gold embroidered leaf at each end, each leaf extending seven eighths of an inch from the end border of the strap.

For a Captain: The same as for a Colonel, according to corps, omitting the eagle, and introducing at each end two silver embroidered bars of the same width as the border, placed parallel to the ends of the strap at a distance between them and from the border equal to the width of the border.

For a First Lieutenant: The same as for a Colonel, according to corps, omitting the eagle, and introducing at each end one silver embroidered bar of the same width as the border, placed parallel to the ends of the strap at a distance from the border equal to its width.

For a Second Lieutenant: The same as for a Colonel, according to corps, omitting the eagle.

For an Additional Second Lieutenant: The same as for a Second Lieutenant.

For Chaplains: Shoulder-strap of black velvet, with a shepherd's crook of frosted silver in the center of the strap.

Officers serving in the field may dispense with the prescribed insignia of rank on their horse equipments, and may wear overcoats of the same color and shape as those of the enlisted men of their commands, and omit epaulets, shoulder-knots, or other prominent marks likely to attract the fire of sharpshooters; but all officers must wear the prescribed buttons, stripes, and shoulder-straps, to indicate their corps and rank.

The shoulder-strap will be worn whenever the epaulet or shoulder-knot is not.

CHEVRONS.

The rank of non-commissioned officers will be marked by chevrons, upon both sleeves of the uniform coat and overcoat,* above the elbow, of cloth of the same color as the facings of the uniform coat, divided into bars a half inch wide by black silk stitching, except for Engineers, which will be white stitching and piped with white points down, according to new patterns in Quartermaster General's office, as follows:

For a Sergeant Major: Three bars and an arc.

For a Quartermaster Sergeant: Three bars and a tie of three bars.

* The chevrons upon the overcoats of non-commissioned officers of Infantry will be of dark-blue cloth instead of light-blue.

For a Principal Musician: Three bars and a bugle.

For an Ordnance Sergeant: Three bars and a star.

For a Commissary Sergeant: Chevrons to be of cadet gray, a crescent (points front) of same color as chevrons and above them.

For a Hospital Steward: A half chevron of emerald-green cloth, one and three fourth inches wide, piped with yellow cloth, running obliquely downward from the outer to the inner seam of the sleeve, and at an angle of about thirty degrees with a horizontal, and in the center a "caduceus," two inches long, the head toward the outer seam of the sleeve.

Chief Trumpeters and Saddler Sergeants will wear chevrons according to patterns in the Quartermaster General's office.

For a First Sergeant: Three bars and a lozenge.

For a Battalion or Company Quartermaster Sergeant: Three bars and a tie of one bar.

For a Sergeant: Three bars.

For a Corporal: Two bars.

For a Color Sergeant: Three bars and crossed United States flags.*

For a Color Corporal: Two bars and crossed United States flags.*

For Right and Left General Guides: Three bars and two guidons crossed, regimental numbers on guidons.*

For a Pioneer: Two crossed hatchets of cloth, same color and material as the facings of the uniform coat, to be sewed on each sleeve above the elbow, in the place indicated for a chevron (those of a corporal to be just above and resting on the chevron), the head of the hatchet upward, its edge outward, of the following dimensions, viz.: Handle, four and one half inches long, one fourth to one third of an inch wide. Hatchet, two inches long, one inch wide at the edge.

Candidates for Promotion will be entitled to wear on each sleeve of their coat a single stripe of gilt lace similar to that worn by commissioned officers. Candidates who have become ineligible by reason of over-age shall be entitled to wear the candidate's stripe on the left sleeve only.

To Indicate Service.—All non-commissioned officers, musicians, and privates, who have served faithfully for one term of enlistment, will wear as a mark of distinction, upon both sleeves of the uniform coat below the elbow, a diagonal half chevron, one half inch wide, extending from seam to seam, the front end nearest the cuff and one half inch above the point of the cuff, to be of the same color as the edging on the coat.

In like manner, an additional half chevron, above and parallel to the first, for every subsequent term of enlistment and faithful service. Distance between each chevron, one fourth of an inch.

Service in war will be indicated by a white stripe on each side of the chevron for Artillery, and a red stripe for all other corps, the stripe to be one eighth of an inch wide.

The Service Chevrons to be worn by enlisted men will conform in color to the arms of the service in which the soldier served. If he has served more than one enlistment in different arms, the service chevron will be of different colors, to correspond.

* "Army and Navy Journal."

The Secretary of War having decided that enlisted men who have served in Indian campaigns, approaching the magnitude of wars, are entitled to wear the distinctive chevron for "service in war," the following campaigns against hostile Indians have been selected, and were announced as being within the scope of the Secretary's decision, June 6, 1879:

Campaign in Southern Oregon and Idaho, and Northern parts of California and Nevada, 1865-'68.

Campaign against the Cheyennes, Arapahoes, Kiowas, and Comanches, in Kansas, Colorado, and the Indian Territory, 1867-'69.

Modoc war, 1872 and 1873.

Campaign against the Apaches of Arizona, 1873.

Campaign against the Kiowas, Comanches, and Cheyennes, in Kansas, Colorado, Texas, Indian Territory, and New Mexico, 1874 and 1875.

Campaign against the Northern Cheyennes and Sioux, 1876 and 1877.

Nez Percé war, 1877.

Bannock war, 1878.

Campaign against the Northern Cheyennes, 1878 and 1879.

Enlisted men who have not completed their term of enlistment are authorized to wear the "chevron for service in war," when they have served in any campaign entitling them to such distinction (as laid down in General Orders No. 56 of 1879), the chevron to be one half inch wide and of the colors prescribed in General Orders No. 92 of 1872, until the soldier reënlists, when it will be worn as therein directed.

The uniform of the enlisted men of the *Signal Service* shall be as follows:

The Cavalry uniform, except that the trimmings and facings be orange instead of yellow, bearing a device on the sleeve of the coat, as follows: Crossed signal flags, red and white, on dark-blue cloth; size of flags, three fourths of an inch square; length of staff, three inches, after the pattern in the office of the Chief Signal Officer of the Army. This device to be worn by the non-commissioned officers above the chevrons; by privates of the first class on both arms; and by privates of the second class on the left arm only, in the same position as the chevron of non-commissioned officers.

Whenever the full dress coat is worn by officers on duty, the prescribed epaulets or shoulder-knots will be attached, letters to be embroidered on shoulder-knots in Old English:

I. G. Inspector General's Department.

J. J. Bureau of Military Justice.

S. S. Signal Service.

Q. M. Quartermaster's Department.

S. D. Subsistence Department.

M. D. Medical Department.

P. D. Pay Department.

Sashes will no longer be worn by officers below the grade of Brigadier General, or by non-commissioned officers.

General Officers above the grade of Brigadier General are allowed, at their option, to wear the sash across the body from the left shoulder to the right side.

The sash may be of buff silk and gold thread.

APPENDIX B.

AN EQUATION FOR PROPORTIONING "THE THREE ARMS" AMONG ANY NUMBER OF MEN.

$$I + C + A = \text{Number.}$$

I = Infantry (generally about $\frac{1}{3}$ the entire strength).

C = Cavalry = $\frac{1}{3} I$. (This fraction is a variable one, depending upon the character of the country, troops, necessities, etc. The normal value is here given.)

$$A = \text{Artillery} = \frac{a}{b} \cdot \frac{I + \frac{1}{3} I}{1000} \times n.$$

In which a = the number of guns to be allowed per 1000 men, b = the number of pieces *per battery*, and n = the number of men in a battery.

Note.— a may vary between 1 and 6, but is usually from 2 to 3; b also varies from 4 to 10, usually being taken as 6. Small n varies with b , it being about 155 for a 6-gun battery, or 25.8 per gun.

$$I + \frac{1}{3} I + \frac{a}{b} \cdot \frac{I + \frac{1}{3} I}{1000} \times n = N.$$

EXAMPLE.

<p>Make</p> <p>$a = 2$</p> <p>$b = 6$</p> <p>$n = 155$</p> <p>$N = 50,000$</p>	$\left. \begin{array}{l} \\ \\ \\ \end{array} \right\}$	<p>We shall then have</p>	$\left\{ \begin{array}{l} I = 39,616; \text{ say, } 40,000. \\ C = 7,921; \text{ say, } 7,500. \\ A = 2,463; \text{ say, } 2,500. \end{array} \right.$
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AUTHORITIES.

Hamley, Halleck, Wolseley, Jomini, United States Tactics, Manuals, and Custom.

APPENDIX C.

AN INDEPENDENT ARMY CORPS (U. S.), ORGANIZED TO GIVE OR RECEIVE BATTLE UPON A LEVEL PLAIN DEVOID OF "NATU- RAL SUPPORTS."

Tactical Army Corps. 36,000 Infantry. 7,200 Cavalry. 18 Batteries, 3,000 men. 6 companies Engin'rs, 800 men. Tot., 47,000 effective men. Upton's Infantry Tactics, § 748, etc. Wolsley's Soldier's Pock- et-Book, etc.	Main Body to form in two lines of bat- tle.	Skirmish line cover- ing entire front (4,000 Infantry).	Skirmish Brigade	4 Battalions of Infantry detached from 1st Divi- sion. 4 Battalions Infantry. 1 Battery Field Artillery. 1 Company Engineers.
		1st or Right Divi- sion. 8,000 Infantry. 18 guns. 1 Co. Engineers.	Right Brigade	4 Battalions Infantry. 1 Battery Field Artillery. 1 Company Engineers.
			Left Brigade	4 Battalions Infantry. 1 Battery Field Artillery. 1 Battery of Position.
		2d or Center Divi- sion. 8,000 Infantry. 18 guns.	Right Brigade	4 Battalions Infantry. 1 Battery Field Artillery. 1 Battery Field Artillery detached from Artillery Brigade.
			Left Brigade	4 Battalions Infantry. 1 Battery Field Artillery.
		3d or Left Divi- sion. 8,000 Infantry. 18 guns. 1 Co. Engineers.	Right Brigade	4 Battalions Infantry. 1 Battery Field Artillery. 1 Company Engineers.
			Left Brigade	4 Battalions Infantry. 1 Battery Field Artillery. 1 Battery of Position.
	Cavalry Division.	7,200 Cavalry. 18 guns.	1st Brigade	2 Regiments. 1 Battery Horse Artill'ry.
			2d Brigade	2 Regiments. 1 Battery Horse Artill'ry.
			3d Brigade	2 Regiments. 1 Battery Horse Artill'ry.
Reserve.		8,000 Infantry. 86 guns. 4 Cos. Engineers.	1st Brigade	4 Battalions of Infantry detached from 2d Divi- sion.
			2d Brigade	4 Battalions of Infantry detached from 3d Divi- sion.
			Artillery Brigade	5 Batteries Field Artill'ry. 1 Battery of Position. 4 Companies Engineers.

APPENDIX D.

NOTES ON AN ADVANCED GAME

*Played at the Officers' Mess, U. S. Military Academy, West Point, New York,
February 9, 1880.*

As an example of the instructions which precede the opening of an Advanced Game, and of the general conduct of such a study, we give the following notes upon one which was played by the officers at the Military Academy, West Point, New York, during the trial of the present code of rules :

The theatre chosen was in the vicinity of Atlanta, Georgia, the scene of Sherman's operations in July, 1864. The problem was to effect and contest the passage of the Chattahoochee River immediately north of that city. The locality comprehended in the map extended from about two miles east of Roswell, where Thomas crossed, to a mile or so south of Soap Creek, the scene of Schofield's successful forced passage by pontoon boats during the same campaign.

The following general and special problems were sent to the various parties concerned :

GENERAL PROBLEM.

"The Game will be played on Map No. 1, which may be seen at the Officers' Mess.

"An advanced force (*Blue*) has been detached from an invading army. It is situated somewhere in the country shown on the map, north of the river. Its orders are to cross the river, and to occupy and hold a position on the left bank, in order to cover the crossing of the main army.

"A force (*Red*), supposed to be about the same strength, is situated somewhere south of the river. Its orders are to prevent the crossing of the hostile army, or, failing in this, to prevent its permanent occupation of a position on the left bank."

ORGANIZATION OF GAME.

<i>Players :</i>	{ Red : First Lieutenant C. P. M., 4th Artillery, Commander. Blue : Captain Ed. S. G., 7th Cavalry, Commander.
<i>Referee :</i>	Captain W. M. W., 6th Infantry.
<i>Director :</i>	First Lieutenant C. A. L. T., 4th Artillery.
<i>Umpires :</i>	{ Red : First Lieutenant V. E. B., Ordnance Corps. Blue : " " E. Z. S., 3d Cavalry.
<i>Assistants :</i>	{ First Lieutenant J. G. K., Corps of Engineers. Second Lieutenants W. C. and H. A. S., 4th Artillery.

"Previous to the commencement of the Game, you are to place your forces anywhere south of the river. You are requested to make these dispositions before the afternoon of February 9th, and upon the map which will be furnished you at the Officers' Mess. You are also requested to submit in writing your general plan of operations, your instructions to your subordinate commanders and to your couriers and patrols.

"For further information apply to Lieutenant S. E. B., Umpire for the Red Army.

"Very respectfully,

"C. A. L. TOTTEN, U. S. A.,

"Director of Game."

First Lieutenant O. P. M., 4th Artillery, commanding the *Red* army, submitted the following to the Director in accordance with request contained in the special instructions for his army:

GENERAL PLAN.

"Upper and lower bridges to be blown up.

"One brigade with 2 Hotchkiss and 2 Gatling guns to defend big bend of river. Cavalry to patrol river from big bend to lower bridge, and assist 1,000 Infantry and 1 battery of 3"-rifles to prevent a crossing at any point below bend till assistance can reach them.

"Reserve to be held at an intermediate point in rear, to render assistance at point of attack."

INSTRUCTIONS TO SUBORDINATE COMMANDER "A."

"You will command the 1st Brigade. Attached to your command will be 2 Hotchkiss and 2 Gatling guns.

"You will prevent the passage of the enemy at the big bend. Blow up the Roswell bridge as soon as possible. Throw up a strong breastwork for your Infantry opposite the ford and below the crest. Place your Artillery upon the crest, and cover it by an earthwork, so constructed as to fire to the right, left, and front.

"Keep me informed by signals.

"Headquarters with the Reserve.

(Signed)

"M., COMMANDING."

INSTRUCTIONS TO SUBORDINATE COMMANDER "B."

"You will command the 2d Brigade and Reserve which will be composed of your own Brigade, one 3"-Rifle Battery, and one 12-pdr. Battery. Take station at the point I will indicate. My headquarters for the present will be with you.

(Signed)

"M. COMMANDING."

INSTRUCTIONS TO SUBORDINATE COMMANDER "C."

"You are placed in command of the Cavalry, 1,000 Infantry, and one 3"-Rifle Battery.

"You will patrol the river from the big bend to the lower bridge.

"Place Infantry and throw up breastworks opposite Soap Creek and the roads north of it, points at which you may expect the enemy to try to force a passage by means of pontoon boats.

"Blow up the lower bridge at once, and keep me informed of everything of importance.

"Your signal station will be established so as to be seen at headquarters, which will be with the Reserve.

(Signed)

"M., COMMANDING."

The instructions of the Commander of the *Blue* army to his subordinates were of a similar character.

NOTES ON THE GAME.

The game was strictly a strategic one, and was played in long "intervals." It was commenced on three maps, but, as it progressed toward the development of *Blue's* plan of operations, the study was transferred to a single map.

Blue planned and massed his forces to cross at the ford in the big bend west of Roswell, and conducted his play toward this general end, sending his pontoon train with a strong detachment down the river, intending to force a passage in the boats at any place which offered.

Red intrenched strongly on the bluff opposite the big bend, and patrolled the river for several miles above and below with large detachments, intrenching at several points along the bank and particularly opposite Soap Creek. His main body was held in reserve, and finally was signaled for, and went to reinforce the troops at the big bend.

The game lasted seven hours, and was played in three afternoon and evening sessions, of two to three hours each. The average length of the "game intervals" was five minutes. Table A showed that the movements commenced at 4 A. M., and lasted until 5½ A. M., at which time *Blue* withdrew and gave up the attempt.

The average time required for playing each 5 minute "game interval" was therefore 15 minutes.

The game was renewed in the evening of the second day by new players, the troops being taken as left by the original players that afternoon. An attempt was now made by *blue* to force the passage of the ford at the big bend, but failed. A strategic demonstration was then made by *blue* at Soap Creek, while his troops withdrew from the river at all other points, and concentrated out of sight to the west of Roswell. *Red* was led to believe that the demonstration at Soap Creek was the main attack, and concentrated hastily in that direction to meet it, leaving, however, troops enough to hold the intrenchments at the ford. In the mean time *blue*, having completed his concentration, moved rapidly around Roswell to a point about a mile and a half above the big bend, and there, at 9 A. M., before *red* could reconcentrate at that point, forced a passage in the pontoon boats, gaining a footing upon *red's* side of the river.

This second game was also a strategic one, was played at 10 minute intervals, and occupied five consecutive hours. The average time required for playing each "game interval" was therefore 13¼ minutes.

The losses upon both sides in the first game were heavy, but, save at the ford and at Soap Creek, were not so in the second, as *blue* effected his final operations with but little opposition.

APPENDIX E.

BEING A BRIEF CONSIDERATION OF SOME NOTICEABLE STATISTICS DERIVED FROM THE WAR OF THE REBELLION.

(FOR STATISTICS, SEE BOOK OF PLATES AND TABLES.)

I. SUFFICIENT data already exist at the War Department, in the offices of the Adjutant General of the Army and of the Surgeon General, to calculate what may be termed Tables of Effectiveness, for use in future wars in the United States. So complete are these valuable statistics that we may fairly predict, within nine tenths of accuracy, the probable amount of sickness per 1,000 men for each of the several classes of troops, during any month in the year and for any section of the country—a prediction which may even be itemized down to particular diseases, with their rates of mortality, etc.

II. These data have already been published by the War Department at various times, in a more or less satisfactory form, the most perfect compilation of the kind being collected together in the medical volume of Part First of the "Medical and Surgical History of the War of the Rebellion," and in the "Reports of the Provost Marshal General." These and other such data are now within easy access of most army officers, and are especially so at West Point, the Artillery School, Division and Department Headquarters, and large posts; but they are not usually within reach of the majority of military students in our land. For the benefit of these latter, the following brief statistical summary is published. It is drawn in great part from the invaluable history above alluded to, and is sufficiently complete to afford material assistance in studying the Advanced Battle and Campaign games. The tables, statements, etc., will usually be found to correspond among themselves, and, where they do not, the authority quoted must be consulted for reasons therefor.

Each of the several series of figures now to be examined will furnish to lovers and students of statistics an almost inexhaustible text for the most valuable deductions. Our own want of space, however, necessitates the suppression of all but the very briefest notes upon the matter presented.*

* In offering this Appendix as a contribution to the literature upon "War on the Map," we aim only at suggesting to private military students the vast *possibilities* of this form of military study. The War Game has already passed through various phases, opportunity to exercise one's self in any of which is the object of the system now presented under the general title of "Strategos." What the

III. Without further remarks, therefore, we shall turn to the immediate consideration of the statistics to be presented.

Table "a" gives a synoptical statement concerning the total number of deaths in the army of the North during the rebellion (i. e., up to June 30, 1865):

Table "b" is similar to the foregoing, but presents the data in a more consolidated form.

IV. From the latter table it will be seen that the proportion of violent deaths to the whole number, from known causes, was, for all classes of troops, about 1 in 3; for white troops, 1 in 2·7; for regulars, 1 in 2·2; for volunteers, 1 in 2·7, and for colored troops, only 1 in 9·8.

V. In order to present a rather more itemized view of the causes of mortality in our army during the period under consideration, we submit the following:

From May and June, 1861, to June 30, 1866, the mean strength of the army in field and garrison was: white troops, 431,237; colored troops, 60,854.

The mean strength in hospital was: white troops, 37,038; colored troops, 2,791—the percentage of constant sickness (in hospital) being for white troops about 8½ per cent., and for colored troops about 4½ per cent.

The total number of white troops killed * in battle was.....	44,238
Died of wounds (gunshot)†.....	32,907
" " (lacerated, punctured, incised).....	869
" chronic diarrhœa.....	30,481
" typhoid fever.....	27,056
" inflammation of the lungs.....	14,738
" consumption.....	5,286
" remittent and intermittent fevers.....	8,140
" dysentery.....	7,313
" measles.....	4,246
" small-pox and varioloid.....	4,717
" typho-malarial fever.....	4,059
" various other causes (i. e., miscellaneous).....	36,587
" unknown causes.....	24,184
Died in the South (prisoners).....	26,168
Add deaths among colored troops.....	33,380
Total number of known deaths ‡.....	304,369

furthest reaches of such a study may be it is at present hard to divine, but it is far from rash to anticipate the most valuable results from the combined efforts of all who, by any inducements, may be led to interest themselves in such a field.

* The total number of wounded treated by the Medical Department during the war was 234,055, or an annual rate of 71,014, i. e., 87 per 1,000 of mean aggregate strength.

† The total number of cases among white troops treated by the Medical Department during the war was 5,825,480, or annually, 1,456,370, i. e., 1,905 per 1,000 of mean aggregate strength. Of this total number, only 166,623 resulted in death, or 41,456 annually, i. e., 54 per 1,000 of mean strength, or, finally, 28·3 cases in every 1,000 treated proved fatal.

‡ In the absence of any accessible American data upon casualties among army horses, we submit the following interesting quotation from the "Army and Navy Journal" of June 12, 1880:

VI. It is desirable next to endeavor to form an estimate of the ratio existing between the number of deaths and the number of troops actually engaged. This has already been done in various quarters on entirely dissimilar principles. For many reasons none of these methods have been deemed satisfactory. "The most reliable plan (though it can not be hoped to be made perfectly accurate) which would seem to offer the greatest probability of arriving at correct results, is the following: The actual strength of the army, as ascertained at certain dates during the progress of the war, may be made use of to calculate the mean strength constantly in service, and this result may be compared with the number of deaths known to have occurred during the period represented."

VII. As an interesting part of the data to be considered in arriving at the above desired approximation, we submit Tables "c," "d," and "e."*

VIII. From a consideration of the foregoing statistics, taken in connection with others found in the reports quoted, but which it is impossible to condense sufficiently to insert in this Appendix, we are enabled to deduce Table "f."

From such a table, those charged with the conduct of a war, within the limits of our own country, may from the seat of the government itself form a very close approximation to the probable "effective strength" of an army operating in distant parts, its aggregate strength being known from official records at hand. This table, of course, gives merely a general average for the whole year and the entire country, but the data from which it was deduced are, in the 100 or more tables of the Medical History, and other sources, even now in such a shape that it is more or less practicable to determine it very closely for any month of the year and for every region, North, South, Atlantic, Central, or Pacific (or even by States; at least, those containing large numbers of troops during the war).

"VITAL STATISTICS OF ARMY HORSES.—In 1843, according to a paper by Surgeon-General Graham Balfour, M. D., F. R. S., read before the London Statistical Society, owing to the heavy losses by glanders sustained by the French army during the preceding two years, a permanent committee, presided over by the physiologist Magendie, was appointed, whose duty was to be the examination of all questions affecting the health and preservation of the horses of the army. The committee established statistical returns, to be furnished annually by the veterinary surgeons of the army, and was authorized by the Minister of War to publish an annual volume, giving the results of these returns and any information it might judge deserving relative to the health of the horses. The first of the reports was brought out in 1847, and twenty volumes were published prior to the breaking out of the Franco-German war. The mortality among the horses of the French army during the thirty years, 1837-'66, averaged 58 per 1,000 of the strength, ranging between 195 per 1,000 in 1841 and 26 per 1,000 in 1862; the proportion cast was 80 per 1,000, ranging between 135 per 1,000 in 1849 and 47 per 1,000 in 1855. The total loss amounted to nearly 14 per cent. annually. Dividing the thirty years into quinquennial periods, the mortality shows a marked progressive reduction, attributable to the improvements introduced by the committee, the deaths in the last five years being only 27.5 per 1,000 against 115 per 1,000 in the first five years. This reduction did not extend to casting, which was higher in the first two than in the last two five-year periods. Menzel, in his work on Prussian army horses, shows that, during the twenty-five years from 1845 to 1869, the average death-rate among Prussian army horses was 26 per 1,000, ranging between 18 per 1,000 in 1856, 1862, and 1869, and 34 per 1,000 in 1859, the latter being exclusive of the year 1866, when the annual proportion was brought up by losses in the field to 131 per 1,000. The information respecting the British cavalry is very meager. The deaths on the average of eighteen years, from 1861 to 1878, were 21.07 per 1,000 horses, ranging from 16.9 per 1,000 in 1864 to 28.1 per 1,000 in 1871. The number cast averaged 98 per 1,000, ranging between 76 per 1,000 in 1871 and 156 per 1,000 in 1878."

* Tables "h" and "i" are introduced into this Appendix, rather on account of their general military interest than because of any intimate connection with the subjects here touched upon. From an independent standpoint, however, and as American military statistics, they are valuable companions to Tables "c," "d," and "e."

IX. We shall close our present studies of the war records of the Rebellion by calling attention to perhaps the most important table we have to submit. This Table "g" shows the annual loss per 1,000 of mean aggregate strength, actually enrolled or engaged, for various causes therein shown, and contains many noticeable points of interest to the military student.

The scope of this table is such as to take into consideration the entire available records of the war. The data therein contained are reduced so as to apply to an average year, and a convenient unit (1,000), with a view to making them applicable to future generalizations.

The total numbers of annually "wounded" per 1000, of mean aggregate strength engaged are: for Regulars, 110.5; for Volunteers, 106.5; for White troops, 105.5; for Colored troops, 101.7; and for Mixed troops, 102.2. Of these numbers, 106 per cent. (say 11) die; 894 per cent. (say 89) returning to duty, or more probably forming a large part of those discharged for disability, etc. By an examination of the above, taken in connection with the data in the column of "Killed in Battle," it will be seen that the "wounded" bear a ratio of about $\frac{1}{2}$ ths to the "killed." In general terms, about $\frac{1}{2}$ ths of the casualties due to "fire" are in "wounded," $\frac{1}{10}$ th of whom eventually die.

From such tables we may estimate, not only the constant effective strength of the various classes of troops (which will probably enter into future armies in our service in very similar proportions to those that obtained during the rebellion), but we may determine the *recruiting factors* necessary to maintain such classes at their normal aggregate. For instance, the "figure" of constant effective strength of 1,000 Regulars (*vide* Table of Constants "f") is 710. But such a body loses (see Table of Annual Losses "g") 261.7 men yearly from its rolls; hence, this latter number must be recruited per year if we wish to maintain its constant effective strength at 710 men. Its daily quota of recruits must then be $262 \div 365 = .717$, which may be sent to the front in monthly detachments of 21.8, say 22 men.

With but one other important deduction from this Table "g," we shall close, and leave the matter in the far better hands of those to whom it may find its way, only trusting that the method here attempted may suggest to them other equally important generalizations which should enter into the numerous special problems of "forecasting" and "probabilities" for future wars upon our soil.

By examining this table with a view to drawing a comparison between Regulars and Volunteers, it will be at once noticed that the former stand "campaigning" far better than the latter, since their "mortality" and "disability" per cents. are *very much* lower. It will also be seen that the Regulars, upon the whole, do the most fighting, since their "killed and wounded" rates are higher than those of any other class of troops. It is at first surprising to find that more than three times as many Regulars *desert* from active service, and ten times as many are "missing in action," as Volunteers; but, when we turn to the columns enumerating the per cents. of "discharges," the reason becomes apparent. The fact that nearly three times as many Regulars as Volunteers are *dishonorably* discharged seems to prove, not only that perhaps a "rougher" set of men go into the ranks of the former than of the latter, but that the discipline is sterner. This, too, is further borne out by comparing the rates of "honorable" discharges and "resignations" from these two classes, which show that it is four times easier to get out of the Volunteer service than it is to leave that of the Regular

Army. Giving, in fact, all of these converse considerations their due weight, the preponderance comes far over on to the side of the Regulars. In this connection, we should not overlook the historical *fact* of undue political favoritism and interference, which procured the "honorable" exit from the Volunteer ranks of so many who, had they been friendless privates, in those of the more rigidly disciplined Regulars, would perhaps have met a far different fate. Nor should the tempting *bounties* offered by the States to secure Volunteers be denied a place in this consideration; these, and the heavy "bonus" so frequently offered for a substitute, in the days of "drafting," must have exerted a powerful influence toward inducing many to desert from the Regulars merely to serve with higher compensation in other parts of the service.

Finally, and in spite of the above disadvantages upon their side of the argument, a comparison of the grand totals in both tables ("f" and "g") tells most decidedly in behalf of "Regular troops." The former shows that at least 64 more Regulars per 1,000 were constantly present with their colors, while the latter places the annual casualties per 1,000 as about 70 less for Regulars than for Volunteers. Thus much for the relative value of these two classes of troops. We have merely studied this subject in the abstract, and with a view to determine its bearings upon our general problem, which may well be reënunciated here as having for its object *to determine the proper method of presenting the teaching of the past for the guidance of the future.*

As to the absolute value, the "figure of merit," so to speak, of the American Volunteers, no one can have any misgiving. Their quality has been too severely tested to admit of doubt, and it is universally conceded that there exists no better material for *soldiers* the whole world over than is the natural outgrowth of the free and liberal institutions of our land.* With the noble record of their services spread before us at this very minute, and written too in such momentous figures, it would be impossible not to recognize the excellence of their standard. This it is no province of ours to discuss. Theirs is the record of the war, and it is simply our privilege to be justly proud of it. We have merely, then, been studying the testimony of the *same material* under the two diverse sets of conditions which modify it, according as it finds its way into the Regular or Volunteer school of discipline and experience, and we have found that our investigations go to establish more securely than ever the superiority of the former school over the latter.

* In one hundred selected reports, in answer to a circular from the Surgeon General, requesting an opinion as to which nationality furnished the most capable soldiers, the preference is expressed by 75 for Americans, by 9 for Germans, by 8 for Irishmen, by 2 for Englishmen, by 2 for Canadians, by 1 for Scotchmen, and by 3 for colored men.

APPENDIX F.

CASUALTY IN ACTION.

A Study of Our Own Arms in the Light of the Latest Improvements in Weapons, and of the Experience upon Modern Battle-fields and Target Ranges.

(FOR TABLES, ETC., SEE BOOK OF PLATES AND TABLES.)

NOTES ON TABLES OF CASUALTY AND FIRE.

INTRODUCTION.—In this Appendix will be found enumerated some of the many data, premises, statistics, references, and considerations upon which the several tables of Casualty have been based. It is impracticable to discuss this subject according to its merits within the narrow limits here afforded, since it covers the whole field of modern projectile warfare, and, consequently, the analysis hereinafter given, in the form of brief notes, will be found to be by no means exhaustive, must be supplemented by independent study and investigation, and, finally, must be considered as merely a suggestive effort at the solution of this very important problem.

Whatever the true solution may be, it is believed that the one submitted is at least relatively just to the various weapons and their several projectiles, and that it will open the way for a future study of the matter of offensive and defensive armament such as can not fail to be of the utmost importance in the expenditures preparatory to war.

Such a study, starting from actual and carefully digested results of extended target-practice and experiments, and progressing legitimately toward even a theoretical *battle effect*, will be sure to result in such a discrimination in favor of certain weapons—as to their several and successive uses in action, their distribution in line, etc.—as almost to promise a direct solution of the great modern tactical problems of the attack and the defense.

The following notes and references are therefore given, in order to assist such private students as desire to go into this subject more deeply than the mere use of the Casualty tables in playing the Advanced Game absolutely requires. Such deeper study is not only a professional duty and pleasure, but, of course, is a matter of necessity for those who desire to qualify themselves to act as skillful Referees.

Tables of this nature can not fail to excite much discussion. It is the inevitable accompaniment of every system of generalization, and the Advanced Game would lose its chief professional merit were any attempt made to avoid it. It is hardly possible that any two would have agreed upon all the elementary considerations which were

necessary at the very beginning of an investigation so new, so complicated, and so perplexing. After due consideration and numerous discussions with brother officers upon the subject, in which all manner of diverse opinions have been expressed, the absolute necessity of a bold and entirely independent decision as to the plan of action became more and more apparent; and, as such a decision has now been made, it is deemed, after a careful review of the whole subject, proper to afford all an opportunity for examining the more important considerations which have influenced the results as given in the tables of Casualty.

The magnitude of this problem will only appear to those who attempt to follow the steps hereinafter indicated, and to such it will be fully established that mere adverse criticism, based simply upon a casual glance at those results, without any regard whatever to the intricate analysis leading thereto, or to the numerous data involved, is not only valueless but captious. To excite thoughtful criticism, however, is the very object of this Appendix, and the solution here offered will at least open up the problem for the benefit of all concerned. Should all such put the same amount of study upon it that has here been spent, and which from its vital importance it certainly merits, then its perfect solution would almost be insured, and could not but redound to our military advantage.

The tables of Casualty accompanying the English rules of the War Game (presumably the same as those of Kriegsspiel itself) not only have no professional value (since no data or guarantees whatever are given as their antecedents), but from an American standpoint are utterly unreliable. The weapons considered are entirely different from our own, as are also the tactical formations supposed to be under fire. There is also a serious lack of freshness to the data upon which these foreign tables are based (as they are probably not fresher than 1866 to 1870, if indeed so fresh), and a careful study and comparison of the effects, as therein recorded, both absolutely or relatively, among themselves, lead us to the inevitable conclusion that they have, and were intended to have, significance only in playing Kriegsspiel as a mere game. But, whatever intrinsic value the foreign tables may have, they are clearly inapplicable to American studies.

Our own data are therefore given, and the whole subject spread before those whom it may benefit, neither avoiding nor inviting criticism, and simply suggesting, to such as may find grounds for regarding any of our results as either too large or too small, that the methods of arranging these results in the tables of Casualty for consultation will afford unlimited scope for any corrections (as by means of multipliers, etc.) that may be found desirable.

I. The figures in the columns headed " : : Deadly Fire " in each table of Casualty are taken directly from the columns headed " Battle Effect " in the corresponding tables of Fire given in this Appendix. Assuming, for reasons hereinafter given, that these effects are the best possible for the range, rate, projectile, and formation, firing or under fire, in each case, they, of course, severally represent 100 per cent. of Battle effect. The effects given in the whole 24 columns correspond more or less closely, and from left to right respectively, to the following per cents. :

Deadly Fire,	1.00	.91½	.82½	.73½	.65	.56½
Heavy Fire,	.47½	.43	.38½	.33½	.29	.24½
Ordinary Fire,	.20	.17½	.15	.12½	.10	.07½
Ineffectual Fire,	.05	.03½	.02½	.01½	.00	.00

It will be noticed that these per cents. vary with decreasing rapidity across the several groups as the fire becomes more feeble.

II. Whenever several ranges, that are considered separately in the tables of Fire, are combined in those of Casualty, a mean of the results as deduced in the former is taken, due weight being given to each effect that is found opposite the several ranges so combined.

III. In each of the tables of Fire it will be noticed that the deadliest case possible has been sought, i. e., the maximum of per cent., rapidity, and effect. This of course must not be lost sight of while examining and comparing the results obtained. In the present day of accurate sights and fuses, reliable range-finders (see "Ordnance Notes," 116), and continually improving firearms and projectiles, this maximum of effect is not only already high, but is a function that is steadily increasing, and to what limits, who can tell?

While, therefore, we have constantly endeavored to lean rather toward the moderate side even of this desired maximum, nevertheless, advantage has been taken of all reliable indications to anticipate some of the more certainly coming improvements in arms and projectiles whereby their effects will soon be bettered.

Such a series of effects having once been carefully determined for each gun and projectile, the several tables of Casualty, obtained directly therefrom, and by a common method, will evidently admit of mutual comparison, range by range, and column by column; a feature not only of considerable importance in the conduct of the Advanced Game, but also of more or less professional value, according to the estimate which may be put upon the tables themselves.

IV. Throughout these tables the fire has been regarded as "direct," and as sweeping a normal extent of hostile front (more or less extended, of course, as the range increases). Direct fire is naturally resorted to in action, unless positive orders to the contrary are given, and will, therefore, always be presumed in estimating casualties, unless due notification of some other direction is given beforehand; as, for instance, that this or that battery is to fire upon some specified object not directly in its front; when it will, of course, be allowable, the tabular number being modified if necessary to suit circumstances. In all cases, however, in which a manifest concentration of fire thus results, it must be borne in mind that effect can not increase directly with quantity of fire (see Table R of Multipliers, Cases 55 to 61). It must also be borne in mind in this connection that Infantry will generally *answer* hostile fire, will instinctively aim at its nearest mark, and, other things being equal, will shoot directly to its own front. Experience has shown that, save in very exceptional cases, the fire of this "arm" in action is very difficult to direct elsewhere, no matter how urgent may be the necessities of the case.

V. The various battle effects given in the tables have been calculated upon the supposition that a stationary Infantry "Line of Battle" was under fire. Battle effect, however, alters very materially not only with the formation *in which*, but with that *against which*, troops fire. Cases 13 to 38, Table R of Multipliers, take consideration of this subject, and an examination of the following table and diagram, explanatory of the terms there used to express the relative disposition of men as to front, will assist the student in his further examination of the same subject.

The Front occupied by

1,000 men in	Line of Battle (2 Ranks, @ 22" per man) = 11,000", or 306 yards.
"	Heavy Firing line (1 Rank, @ 22" per man) = 22,000", or 612 yards.
"	Thin Firing line (1 Rank, @ 44" per man) = 44,000", or 1,224 yards.
"	Heavy Skirmish line (1 Rank, @ 88" per man) = 88,000", or 2,448 yards.
"	Thin Skirmish line (1 Rank, @ 176", say 5 yards, per man) = 15,000', or 5,000 yards.

The Party exposed to the direct fire

Of 1,000 men in Line of Battle....	{	If in Line of Battle, numbers.....	1,000 men.
		" Heavy Firing line "	500 "
		" Thin Firing line "	250 "
		" Heavy Skirm. line "	125 "
		" Thin Skirm. line "	62 "
		If Cav'y in its Line of Battle, numbers	275 "

The Party firing (1,000 men),

If in Heavy Firing line, covers	2,000 men in Line of Battle.
If in Thin Firing line, "	4,000 "
If in Heavy Skirmish line, "	8,000 "
If in Thin Skirmish line, "	16,000 "

Figure 15, Plate VII, shows the relative numbers per front according to the formations above noticed and defined.

VI. An examination of a target after practice will show that the "hits" are generally scattered pretty evenly over its whole surface, as to their vertical arrangement, and more or less so as to their lateral. Were the fire truly *direct* for each piece, as would be the case more or less in action, and is assumed to be the case in the tables, then this even dispersion as to lateral as well as to vertical arrangement of hits would probably be the practical result.

There are, however, two noticeable exceptions to this law, that of the Gatling gun, Cal. 45, whose vertical dispersion up to 1,000 yards is very slight, its lateral being governed by the oscillator and limited only by range, and that of infantry fire, where each elementary projectile is more or less dominated over by a directing power. In the case of other projectiles, as, for instance, case-shot, shell, and canister, the elementary fragments, from which Target effect results, fly in absolutely independent paths, over which no individual control is exercised at the gun, and are liable to hit high or low, right or left of any part of the "mark" aimed at. The diagrams of the targets made by various guns, as given in the Report of the Chief of Ordnance for 1874, admit of a very interesting comparison in this particular. From such a comparison it is assumed that in general but one third of those projectiles which strike the target pass through the "man-spaces" thereon, and that the remaining two thirds pass through the intervals between them, and are thus ineffective. Hence, one third of Target effect gives us an approximate Battle effect for all guns except the Gatling, Cal. 45, and the infantry arm, in which cases, owing to the peculiarly effective horizontal dispersion of the former, and the greater amount of practical control over the flight of projectiles of the

latter, at least one half of these projectiles are presumed to pass through the "man-spaces" up to 1,000 yards, beyond which, and up to 2,000 yards, the proportion gradually changes to one third, remaining constant thereafter at the latter figure. The above proportions are, of course, only approximations, and are taken in such simple terms in order to avoid an immense amount of calculation. They may, however, be regarded as practically correct, and as relatively just in the cases noticed.

In applying these fractions to determine Battle effect, especially at short ranges, the resulting numbers will frequently be found to exceed the number of men actually in the equal and opposite line (see Cases of Gatling Gun and Hotchkiss Revolving Cannon); and, since of course the number of casualties can never exceed the number of men exposed, this latter number has always been introduced into the proper Table of Casualty, instead of the regularly deduced Battle effect, as per corresponding Table of Fire, whenever the latter is the larger of the two. This number has also been retained therein, across the table, until by the regular law of decrease (§ I) the latter falls below the number of men actually exposed, after which the proper per cent. of the deduced Battle effect may be employed.

VII. As a general rule, in the columns headed "Per Cent. of Hits," in the several tables of Fire, cognizance is only taken of aim as to *accuracy* and of fuses as to *certainty*. In those headed "Battle Effect" are considered: the cone of dispersion as to *form* and *size*, remaining velocity as to *power*, and intervals (or the proportion between the targets employed and the spaces which would be actually occupied by the troops in line which they are intended to represent). The effect of interval is, of course, constant at all ranges, but the other elements above mentioned exert a sort of mutually inverse influence upon casualty in action, regarded as a function of range and rapidity, and as compared with Target effect.

At short ranges they conspire rather toward *lost* hits (i. e., where the same "man-space" receives several), toward *double* hits (i. e., where the same shot or discharge carries away men from both ranks), and toward relatively *few* effective hits; while at long range the reverse generally obtains. The ranges of best absolute effect and best relative effect fall between these extremes, are not necessarily coincident, and are far from or near to the gun, according to the special circumstances of fire in each case.

VIII. A few quotations are given below from some of the most experienced observers upon the latest battle-fields, and from the pens of advanced military thinkers, and which bear more or less directly upon our subject:

A. INFANTRY.—(a) "An infantry which has its flanks protected and does not mind long-range fire, and opposes to the enemy's rushes its cool volleys, is invincible."—Colonel Clive, "Ordnance Notes," No. 111.

(b) "A front attack upon a line of infantry in a good position has nowadays little chance of success unless it is sufficiently prepared and supported by artillery; indeed, a considerable superiority gives no guarantee of success. . . . The effect of musketry offers an extraordinary power to the defensive. The more troops that can be extended for this purpose, the more effect. . . . On the offensive with a front attack, one must be prepared to suffer enormous losses in a short space of time. A few instants decide upon the bravery of companies and battalions, and second and third lines are necessary as reserves to fill up the rapidly forming gaps. . . . Independent fire, well directed,

is calculated to scatter any column.”—“Studies in Troop-Leading,” Colonel I. Von Verdy du Vernois.

(c) “In all of Gourko’s operations, during and after the passage of the Balkans, there was *no instance in which a fortified place was assaulted in front*. Having a superiority of force, he threatened the enemy’s front (occupying their attention with the fire of a skirmish line, with strong supports posted in the nearest shelter), and turned their flanks, compelling their retreat—the tactics, in short, of Sherman’s Atlanta campaign. The counter-attack of the Turks was received with careful, cool volley, firing by half companies, delivered when the Turks were within 150 yards, and in every case attended with success.”—Green’s “Report,” 1879.

(d) “The tactical gain of the defense has forced upon the attack the necessity for manœuvring to strike in flank rather than in front, and this leads on both sides to the great extension of front now usual. Again, the great losses of the offensive lead to the more frequent use of night attacks.”—Frazer’s “Gold Medal Essay.”

(e) “The constant use of this fire [long-range infantry fire] by the Turks is the *most striking feature in the tactics of the late war*.”—Captain Needham, “Ordnance Notes,” No. 112.

(f) “By concentrating fire, the dangerous zone is increased by the variation in range of the different projectiles, so that *it is possible*, under certain circumstances, to obtain a useful effect up to the extreme limits of sight—i. e., 1,968 yards, or even to the extreme range of the rifle, about 3,800 yards.”—“Ordnance Notes,” No. 111.

(g) “The number of Turkish bullets which fell among the Russian ranks, when they were still 2,000 yards away from the defenders’ position, was such that divisions which at the outset numbered from 10,000 to 12,000 men were speedily reduced to a strength of from 4,000 to 5,000; in other words, *they lost half their effectives*.”—General Todleben.

(h) Speaking of the attack upon Loftcha, Captain Kouropatkine states: “At 2,000 yards from the Turkish position, Russian soldiers were struck down by the defenders’ bullets, and at 1,500 yards men were falling rapidly on all sides.”

(i) “The Russians began to suffer loss at 3,000 paces [2,500 yards] from the defenders’ position; at 2,000 paces [1,700 yards], men were falling rapidly; and, as the attack progressed, the reserves suffered nearly as much as the firing line.”—General Zeddeler.

(j) “It has been satisfactorily proved that, if a company of infantry succeed in creeping up to within 1,200 or 1,500 yards of a battery of artillery, *horses and men would all be disposed of in a very few minutes*.”—“Ordnance Notes,” No. 111.

(k) “The breech-loading musket keeps the artillery at a distance of not less than 1,000 yards; otherwise, its horses will all be picked off.”—Green’s “Report.”

(l) “In some of the more obstinately contested struggles of the campaign, each man is said to have fired 200, 300, 400, *and even up to 500 rounds*, and yet I do not find a single instance recorded of the Turks running short of ammunition.”—Captain Trotter, R. E., “Ordnance Notes,” No. 112.

(m) “Any good breech-loader can be fired with deliberate aim over five times a minute.”—Appendix W to “Report of Chief of Ordnance for 1879.”

(n) “We may expect that fire will be more or less aimed, up to 1,500 and 2,000 yards. . . . With a view to keeping the hostile musketry at least 1,400 yards from the guns, some of the infantry should be 600 or 700 yards in front of the flanks of the artillery position, or directly in front, if the position be extensive. . . . At long range, bullets fall with a

considerable drop, and this, it is thought, is partly the secret of the moral effect of long-range fire. Every one expects to see men fall when fired at; but there is something uncanny in seeing comrades drop down even behind cover and apparently without cause. The effect of the discovery that, against long-range fire, 'cover' is 'no cover,' is very marked in Kouropatkine's account of the advance of the Kazan Regiment against the Turkish second line at Loftcha. At 1,600 or 1,700 yards they took shelter behind small boulders lying in the open, but they soon learned that the bullets found them out."—Frazer's "Gold Medal Essay."

(o) "The great fact of modern tactics is, that in the last few years the defense behind fortifications has enormously gained upon the attack, owing to improvements in small arms; or, in other words, that any attacking force is now at a very much greater disadvantage than it was fifteen years ago. . . . After the surrender of Plevna, General Skobelev ordered the men in his division to keep their spades and shovels, and carry them on their persons; every man carried an implement of some kind, about 85 per cent. being of spades or shovels, 10 per cent. picks, and the rest axes, etc. His division marched with these on their backs from Plevna to Constantinople; they were heavy (weighing over 5 pounds), they were uncomfortable, they were in every way inconvenient, but each man had learned by hard experience to feel that his individual life depended upon his musket and his spade, and he took good care to lose neither the one nor the other. . . . All other weapons are dwarfed before the breech-loading musket, firing easily 5 to 6 shots a minute, and carrying to a range of a mile and a quarter. Therefore, infantry is now more than ever the arm of the service upon which all the hard fighting devolves, which inflicts and receives the greatest damage, and to which all other parts of an army are merely subsidiary."—Green's "Report."

(p) Speaking of the attack at Gorni Doubinak, on the Orkhanie road, where Gourko, with 20,000 men and 54 guns, advanced on their lines and made a concentric attack on the two redoubts and outlying shelter-trenches that formed the post, Major Frazer (Gold Medal Essayist) goes on as follows: "The Guard came on with a courage beyond all praise. They had been sent for as the 'Saviors of the Army.' Unworn by war, unhindered with the pack, they advanced, cheered by their own guns, and fearful only of finding themselves afraid. But, when more than a mile from the post, their ranks began to thin, struck down by invisible forces that no cover seemed to check; as they reached the zone where rushes alone were possible, each last resting-place was marked as they rose by a line of dead. Over and over again the clumps of skirmishers advanced to storm the main work; each time the bulk either fell or fell back; a few reached the steep ditch and there found shelter, and, as the tide ebbed, all the hollows and bits of cover remained tenanted by riflemen. These kept on working for the ditch, and at dusk the numbers in it increased. [Part of the defenders now withdrew, and the Russians, cutting footholds in the scarp with their bayonets, bravely stormed the work in the dark, capturing some 2,000 Turks.] We are told that some of the Guards at Gorni Doubinak, weary at seeing no results, would not fire any more, but went on " (doggedly) "without it."—Frazer's "Gold Medal Essay."

(q) "It is stated that, in the terrible advance upon Gorni Doubinak, some actually fell asleep under fire from exhaustion, and were shot as they lay."—Zedeler, "Practical Conclusions from our last War."

(r) "After all, there is a limit to the effect of fire, and, whenever the attack has been pressed home, some at least have reached the goal, and that, too, in a mood that gives

them tenfold force. For so intense is the strain of being every instant face to face with death, perhaps for a whole long hour, that the desire to end it anyhow gives an impulse beyond the gauge of rule, and that thrusts men on as if safety only lay before them. This show of resolve reacts on the defenders, and at the end would tend to shake their purpose, but that their losses when intrenched are so small and those they inflict are so great that most often the contest is unequally in their favor. . . . There has been and is a steady increase in the relative importance of musketry fire, which has made it beyond all question the decisive arm, while protection from it has become the first object in intrenching. The development of a system of musketry bombardment may now be looked for, and will lead the defense to avoid its effects by concealment generally, and chiefly in the case of the decisive strongholds, so as to diminish, as far as possible, the disadvantage of immobility."—Frazer's "Gold Medal Essay."

B. ARTILLERY.—(a) "That the effect produced by artillery fire is due as much to the moral as to the material damage occasioned by it is a very old proposition. In the campaign of Bohemia, in 1866, of the total losses suffered by the Austrians only some 3 per cent. were occasioned by artillery fire; over 90 per cent. of the total losses were caused by the bullets of the needle-gun, 4 per cent. by cold steel, and 3 per cent. by artillery fire; and during the battle of Gravelotte, of the total Prussian losses, while over 90 per cent. were caused by bullets, less than 5 per cent. were caused by artillery fire. Nevertheless, it was expected when the late war began that the Russian artillery, far superior in the number of its guns to that of its adversary, would influence in a very decisive way the operations of the campaign; but, as a matter of fact, it contributed *little or nothing* to the success achieved, . . . a fact that . . . must be in part attributed to the faulty manner in which it was handled. . . . The Turkish works were admirably designed to withstand artillery fire. . . . As one of the many instances which go to prove how effectual was the cover provided, I may mention that it has been stated to me that on one occasion more than 300 shells struck or fell within a single Turkish redoubt, and that only five of its garrison were wounded."—Captain I. L. Needham, R. M. A., "Ordnance Notes," No. 112.

(b) "At Carmali the Russians threw 300 shells into the main redoubt; the full garrison lost only five men."—Frazer's "Gold Medal Essay." Hence, at 9 fragments (effective) per shell, about $\frac{1}{34}$ th were effective.

(c) "As regards the loss caused by artillery, I made an estimate that at Kars the Russians fired 150 shells for every casualty that occurred. While I was with Ismail Pasha's force in the Erivan district, on one occasion, I saw 60 or 70 shells burst in the immediate vicinity of a Turkish field battery. I went down to ascertain the number of casualties, and I found there had only been one man touched."—Captain Potter, R. E., "Ordnance Notes," No. 112.

(d) "The practice as shown above [see "Ordnance Notes," lxxxix] is wonderfully accurate, and proves that field artillery is capable of far more accuracy of shooting than has yet been attained. . . . The effect of shrapnel is shown to be more than ten times as great as that of common shell at the same range and fired with the same concussion fuse. We commend this fact to the attention of those who continually underestimate the power of the latest field artillery, quoting statistics drawn from the action of *old* field-guns fired at troops behind cover. . . . It is found, as a general rule, that the muzzle-loader has slightly the advantage in rapidity of firing. There are at present no protected field-guns in Europe, and the *subject remains to be worked out*. . . . It is hardly

possible to overrate the advantage of such protection; because not only would the lives of valuable trained gunners be saved, but the fire of the guns ought to be as accurate as on the practice ground, because that chief element of nervousness, the fire of the enemy, would no longer affect them."—London "Times," August 30, 1878.

(e) "With the best modern artillery the shell is *in advance of the sound* up to at least 2,000 yards; at 2,400 yards, sound is only a second, and at 4,000 yards, only about four seconds, in advance."—Frazer's "Gold Medal Essay."

(f) "At 1,500 yards the vertical dispersion of a field-gun is only about 3 to 4 feet; at 4,000 yards, it becomes 20 to 24 feet. . . . Retirement *above* the general level is, as regards safety, in a measure equivalent to retirement from the front. At the Kizil Tepe, 100 guns at effective range failed to silence the 2 Turkish batteries and 13 battalions that held it."—Frazer's "Gold Medal Essay."

(g) "Unlike the war of 1870, where the superiority of the Prussian artillery contributed very materially to the success of the campaign, in the war in Turkey the Russian artillery, although greatly superior in numbers to that of the Turks, played but a minor part. . . . With few exceptions (at Telis, Loftcha, and Aladja Dagh) it contributed to no victory, and averted no defeat. . . . The total losses inflicted by it were probably but little over one per cent. of those inflicted by the infantry, and these were nearly all by shrapnel. . . . As infantry fights in open order, shells can evidently do but little against it. But with shrapnel and a good time-fuse, much can be accomplished against troops, even in dispersed order, and especially against a line of men in a shallow trench. There are many instances of the effective use of shrapnel in Turkey. . . . The proper use of artillery at the present day is with *shrapnel* carrying to 3,000 yards, and with *guns massed* and their *fire concentrated*. Its employment with shells is likely soon to be almost as obsolete (in the field) as its employment with solid shot."—Green's "Report."

(h) "The *preparing power* of artillery when opposed to intrenchments [attack on woods, cover, etc.] would appear to be less than was thought from the results of 1866 and 1870. The distance to which guns are relegated by musketry fire has been and is still increasing, and the need for improving their shooting, for using them in mass, and for oblique and enfilade fire, has become, if possible, more apparent."—Frazer's "Gold Medal Essay."

C. CAVALRY.—"Concerning the use and the tactics of artillery and *cavalry*, there is little to be said as the result of the war in Turkey. The cavalry never fought in any great battle in Gourko's first expedition over the Balkans. It accomplished some purpose in cutting the railroads and telegraphs, and in covering Gourko's retreat; during the latter, it fought on foot on several occasions. The true use of cavalry in modern warfare was developed in our Civil War, viz., in scouting and reconnaissances, in independent raids against lines of communication and supply, in following up a retreat, and in doing its heavy fighting always on foot. *Since 1865 there has been nothing new on the subject.*"—Green's "Report."

D. GATLING GUNS.—(a) "At least 10,000 cartridges should be carried with each gun. Musket cartridges weigh about 110 pounds to the thousand. The cartridges should be carried in the limber-box, and, where caissons are used, in the caisson-boxes. A limber and an ordinary field caisson will carry 10,000 musket cartridges. As it will hardly be practicable to have more than one caisson to each piece for the larger guns, the ammunition in excess of that carried in the limber and caisson must be carried in common army wagons."

(b) "In the late Prussian war, the Gatling gun was used by the French, conjointly with the mitrailleuse. From the 'London Journal' we clip a correspondent's description of its efficacious use in action: '. . . A column of troops appeared in the valley below us, coming from the right—a mere dark streak upon the white snow; . . . an aide-de-camp came dashing down the hill with orders for us to pound at them at once Rr-rr-a go our Gatlings, the deadly hail of bullets crashes into the thick of them, and back into the woods the dark mass slowly retires, leaving, however, a trace of black dots upon the white snow behind it. This their famous and historical four-o'clock effort, and its failure, has decided the day. That one discharge was enough.'"

(c) Extract from an article by Captain A. Litvinoff, entitled "Action of Battery Guns in Khivean Expedition," in the Russian "Artillery Journal," January, 1874. The guns were of Gatling model: "First I had to find out the range; for this purpose I fired three cartridges, changing each time the height of the sight. The distance found was between the limits of 1,050 and 1,170 yards. Then I laid both guns, aiming one at a large band of Turkomans, and the other at another band formed not far from the first. Opening at the first band, I fired rapidly 25 rounds; the band immediately dispersed, part of the men joining the second band. Opening from the second gun, I fired 50 rounds without interruption; the second band dispersed at once, the men betook themselves to the broken ground, and disappeared behind some hills and in the irrigation ditches. Several times the enemy, collecting in masses of some strength, moved against us, but was each time driven back by our fire; thus I had several opportunities of firing a succession of 25 or 50 rounds, the directions of the guns and their elevations varying somewhat, according to the circumstances. In the whole, the battery guns fired that day 408 cartridges. The guns were permitted a very slight side motion. The ground was of clay, covered with scant vegetation, and the fall of the bullets on such ground and their ricochets were easily seen from the battery, even at a distance of 1,170 yards."

(d) The correspondent of the "Illustrated London News," in a semi-official report of the conflict, says: "About five o'clock, the Huascar being clear of the shoals, we seized the opportunity to close. The enemy likewise closed, with evident signs of ramming, firing shell from her 40-pdr. Our Gatling gun then commenced firing from the foretop, causing the men on her upper-deck quarters to desert their guns."

(e) "The employment of the Gatling in the recent action of the Lord Cochrane and the Huascar, seems to indicate that the *importance of the machine gun has been underrated*, and, with the admirable weapon supplied our service, we should not be behind in an appreciation of its capabilities."—William M. Folger, Lieutenant Commander, U. S. Navy.

(f) "In a lecture delivered by Lieutenant Colonel H. C. Fletcher, Scots Fusilier Guards, a member of the committee of which Colonel Wray was president, before the United Service Institution, on January 22, 1872, he states: 'The experiments clearly showed the deadly effect of the fire of the smaller Gatling at ranges up to 1,400 yards, while the larger and medium guns gave good results at ranges up to 2,070 yards.' Now a range of 1,400 yards comes very close to the efficient range of the best field artillery of the present day, and a Gatling battery well managed could prevent a field battery from firing a shot, if both arms attempted to get into battery at the same time, at 1,200 or 1,400 yards from each other. The targets show that the firing of the smaller Gat-

ling has great accuracy at this distance, it being capable of striking a battery front at every shot, and six guns would pour a continuous stream of 1,200 musket balls per minute into the hostile battery. We believe that any artillerist will acknowledge that no field battery could come into action under such a fire. The targets made at 2,070 yards, referred to by Colonel Fletcher, were in competition with the British 9-pdr. bronze muzzle-loading and 12-pdr. breech-loading field guns, and represented 36 cavalry or 45 infantry. The Gatling 1-inch and 0.65-inch guns in every case disabled more men than did the 9-pdr. and 12-pdr. guns."

(g) Again, Colonel Fletcher says: "From a comparison of a series of eleven trials of the small-sized Gatling, of the 9-pdr. muzzle-loading field-gun, firing shrapnel, and of the Martini-Henry rifle, fired by six Guardsmen, at ranges from 300 to 1,200 yards, and under various conditions in regard to time and known and unknown distances, I find that the Gatling made 2,699 hits, the 9-pdr. muzzle-loader, 1,620 hits, and the Martini-Henry, 718 hits; that is, the Gatling was about $3\frac{3}{4}$ times and the 9-pdr. $2\frac{1}{4}$ times more effective than the Martini-Henry in the hands of six soldiers, a result I would venture to term satisfactory as regards infantry fire. Not that I mean to affirm that this comparison is a true measure of the efficiency of the 9-pdr. and Gatling as compared with infantry. To say that the fire from a field-gun was only equal to that of 14 infantry, and that that of a Gatling was not more deadly than the fire of 22 infantry, and to measure their efficiency in the field by this standard, would lead to very erroneous conclusions. Each arm, I contend, has its own duty to perform, and there are moments in battles when no field-gun or Gatling would counterbalance the absence of even a section of infantry, as there are times when a single shell from a 9-pdr. or a volley from a Gatling would be worth more than the presence of a battalion."

(h) "New York Times," July 17, 1877, says: "The stubborn fight which Chief Joseph made last week, near the mouth of the Cottonwood, against a superior force of our troops, has roused the country to an appreciation of the fact that we have a war within our domains quite worthy of public attention. This affair derives additional interest from the successful employment of Gatlings and howitzers, to which, in fact, the dislodgment of Joseph was largely due."

(i) "London Army and Navy Gazette," February 22, 1879: "The Gatling guns landed with the naval contingent from the Active and Tenedos have astonished the Zulus, who have been trying an engagement with our blue jackets. They found the fire much too hot, and the naval force has had the satisfaction of carrying more than one contested position. It is a pity that Gatlings are not more plentiful with Lord Chelmsford's army. The naval brigade have some, but the artillery have none. If there had been a couple of Gatlings with the force annihilated the other day, the result of the fight might have been different, for Gatlings are the best of all engines of war to deal with the rush of a dense crowd."

(j) A letter from Lima, describing the defeat of the Peruvian army at the heights called San Francisco, says: "The earthworks were defended by a strong Chilian force, plentifully supplied with Krupp field-pieces and Gatling guns. Here Buendia committed the error which has cost the allies the best division in their army. Instead of making a detour, which he could easily have done, and thus compelling the enemy to descend to attack him in the pampa at the rear of the hill, or submit to having his communications with Pisagua cut off, Buendia gave the order to charge up the rugged hill and carry the works by storm. The attempt was gallantly made. Three times the

shattered regiments, which had undertaken a feat which it was impossible to perform, were compelled to fall back and reform, leaving the hill-side thickly covered with their dead and dying, who had fallen in masses before the Krupps and Gatlings long ere they could make their rifles tell."

IX. NOTES ON TABLE OF FIRE "a" OF SPRINGFIELD RIFLE, CAL. 45.

A. Consult the General Notes at the opening of this Appendix.

B. REFERENCES.—"Reports of Chief of Ordnance for 1874-'78"; "Description of Springfield Rifle and Carbine," National Armory, 1874; "Ordnance Memoranda," No. 15; "Ordnance Notes," Nos. xlix, lv, lvi, lxxxvi, lxxxviii, xci, xciii, 107, 111, 112; General Orders, Reports, etc., on Target Practice; Records of National Rifle Association; Wingate's and Laidley's Manuals of Rifle Practice; Green's "Report," etc.

C. CHARGE, ETC.—As the result of experience in rifle practice at home, and of the latest foreign improvements in small arms and their use, it is understood that the regulation powder charge is to be increased, the projectile made heavier, and the number of grooves and their twist increased to correspond. These improvements have to a certain extent been anticipated in this table, and, of course, tend to increase the efficiency of the weapon as to accuracy and range.

D. RANGE.—Up to 2,000 yards (the limit of distinct vision) we already have more or less accurate data; but beyond this range and up to extreme small-arm range (say, perhaps, 4,000 yards at the best) our data are mostly exponential and theoretical. To meet the demands of long-range practice, the sight must be improved so as to cover at least 2,000 yards.* In a similar way, a very deadly "drop" or vertical fire, at *short range*, may be accurately obtained, the use of which against intrenched lines of infantry should be manifest.

E. NUMBER OF ROUNDS.—The average rate of fire at all ranges is about 5 or 6 rounds per minute. Battle rate tends to increase as the range decreases, the maximum effective rate being from 10 to 12 shots per minute. The accuracy, of course, suffers as the rate is increased beyond the average. The efficiency of the magazine-gun now on trial (Hotchkiss), and of any such arm likely to be adopted for military purposes, is duly considered in these remarks (see also Appendix T, "Report of Chief of Ordnance for 1878.") Should, however, greater rapidity than is here allowed as a maximum at length be obtained, and be combined with equal accuracy, a suitable multiplier will, of course, make the table applicable.

F. NUMBER OF FRAGMENTS PER ROUND.—Should the multiball cartridge, now on trial, be adopted, it will only be issued in small quantities, and for use at short range. Battle effect will undoubtedly be made relatively more *certain* by the use of this projectile, and at short range will probably be materially increased thereby. The Ordnance Report for 1879 (published in January, 1880) is replete with the most valuable diagrams, statistics, and tables upon the "possibilities" of long-range fire, and the use of the multiball cartridge at short range (say, up to 300 yards with rifles, and 100 with the revolver).

* For ranges beyond this, the *ramrod* might be rudely graduated, at heights varying with the range intended to be reached by "unaimed fire," and used as the Indians do an "aiming-stick." By resting the breech of the gun upon the ground, and supporting it at the lower band against such a ramrod, the "dangerous zone" may be projected as far to the front as desirable, within the limits of extreme range.

For the revolver multiball cartridge, the effect "up to 25 yards is not superior to the uniball (since the balls group within so small an area). Above that range (up to 100 yards), this effect is equal to two and sometimes three uniball cartridges." Of the rifle multiball cartridge, this report states that, "up to 30 yards, it is not superior to the uniball; between 30 and 175 yards (about), in firing at a front of men, the (hitting) effect is equal to three uniball cartridges. In firing at a single object, it is inferior to the uniball above 100 yards."

G. PER CENTS.—This column contains several sets of per cents.; those upon the left and extending throughout the column correspond to the average target accuracy in the Regular Army and organized National Guard (see various reports thereon; also, consult G. O. No. 5, H'd-qrs. Batt. of Eng'rs., Willet's Point, N. Y., June 30, 1879). It will be noticed that the mean average per cent. from 100 to 500 yards is equal to .76. This is the mean annual per cent. of the Engineer Battalion for 1878-'79 for the same ranges. This battalion was taken as a standard simply on account of the fullness of its records. Among regular organizations it seems to hold a place rather above the mean average, and is, therefore, better suited for the attainment of "Deadly fire" as required by the table. The same data, however, will be found in a more fragmentary condition in all the reports of military rifle practice that may be examined. Opposite ranges 100 to 900 yards, an intermediate series of per cents. will be noticed; these are *discounts* of those in the first column due to increased rapidity of fire, thus: 30 = $37\frac{1}{2}$ per cent. of 80, etc. The several per cents. come from an exponential curve based upon the fall of the per cent. (at 100 yards) from .80 (corresponding to average rapidity) down to .50, as the rate of fire increases to 12 rounds in a minute. It goes upon the further assumption that, *ceteris paribus*, the loss of accuracy due to increased rapidity of fire is relatively the same at all ranges. The third and last series of per cents. are the resulting ones by which the column of Target hits is determined. At from 900 to 1,200 yards, the per cents. are unchanged, as the rate of fire does not require it. At from 1,200 to 2,000 yards, the per cents. allowed are respectively halved, two different elevations of sight being considered as employed; while, at from 2,000 to 4,000, three such elevations are presumed. Effects should, therefore, be doubled or tripled where but one elevation is employed, etc. Examination will show that the best *per cent.* is thus attained around 500 to 600 yards, while the greatest number of *target hits* is obtained at from 100 to 300 yards, and finally that a good per cent. can be maintained up to at least 2,000 yards.

H. BATTLE EFFECT.—In changing from Target effect to Battle effect, the following fractional amounts of the former are allowed to influence the latter in the score of intervals: one half up to 1,000 yards, changing from one half to one third in the passage from 1,000 to 2,000 yards, beyond which it is maintained at one third (see General Note, VII). At from 2,000 to 2,500 yards, one fifth of these are considered as lacking "remaining velocity" enough to put *hors de combat*; one fourth being thus affected at 2,500 to 3,000 and one third at 3,000 to 4,000 for the same reason.

I. REMARKS.—Some remarkable developments may be expected as the results of actual experiments and practice, instituted with an express view of determining the true inwardness of long-range musketry fire. It is now generally admitted to be the chief tactical lesson to be gained from the Russo-Turkish war. It was then employed, though often with the most deadly efficacy, only in a hap-hazard and desultory manner. When, however, its full value is determined, and correct rules for its employment are formulated, we may expect the most interesting kind of data for consideration. It

may be that the velocity due to "drop" from the great height of trajectory for long ranges will more than compensate for the loss of translation due to the original impulse, and that, when the whole science of long- and short-range "musketry bombardment" has been carefully studied out, its accuracy may be depended upon as confidently as that of the latest forms of mortar practice (i. e., with the best systems of rifled and chambered mortars).

X. NOTES ON TABLE OF FIRE "b" OF GATLING GUN, CAL. 45.

A. Consult the General Notes at the opening of this Appendix.

B. REFERENCES.—See "U. S. Light Artillery Tactics"; "Reports of the Chief of Ordnance for 1874-'79"; "Ordnance Notes," 119; "Ordnance Memoirs," 17; "Reports of Colts Arms Co.," etc.

C. CHARGE, ETC.—This gun will probably keep apace, if not ahead, of any improvements incident to small-arm ammunition and its efficient employment. With the Wright multiball cartridge, within 300 yards' range, no body of men could stand before the "rain of death" delivered from this gun. (See "Report of Chief of Ordnance," 1879.)

D. RAPIDITY OF FIRE.—In the tables this has been caused to range from a maximum at 100 yards down to the average heavy at 1,000 yards, which is thence maintained up to extreme range.

E. ACCURACY AND PERCENTAGE.—Always high. (See References and Records of Practice.)

F. BATTLE EFFECT.—The dispersion commences at the muzzle of each gun, and is a slightly curved, fan-shaped surface of some 12° maximum spread. This, at 20 yards interval between the guns, causes the front at 100 yards' range (to wit, 121 yards) to be just covered by the six guns of a battery. Up to this range there are dead spaces between the guns, but beyond it a cross-fire obtains, which searches the front with an effect that increases up to 600 yards almost as rapidly as the effect from each several gun from thence (100 yards) diminishes on account of the constant angle of dispersion. There results from these circumstances an effect sufficient, when at its best, to carry away the whole of the line exposed within the limits of the dispersion and up to 600 yards' range. This state of affairs can be readily seen by the student himself with the aid of a simple diagram, constructed to a scale and indicating the cross-fire in front of such a battery. From the peculiar sheet sort of dispersion, attained by means of the Gatling oscillator, uninfluenced as it is at the last moment by any additional and disturbing cone, due to the bursting of individual projectiles, the fire of this gun loses less effect (one half) through the intervals than canister-, shrapnel-, or shell-fire. From 1,000 to 2,000 yards this loss gradually increases to two thirds, remaining constant thereafter. The targets shown for trials, Nos. 4, 11, and 13 ("Report of Chief of Ordnance," 1874), as compared with those made at trials Nos. 1, 8, 16, etc., show how evenly the Gatling projectiles fly, how little the target is spattered, and how effectively it is swept. This control that can thus be exercised over each pellet, as it were, that flies from the Gatling battery, is not the least argument in its behalf. On account of the rapid loss of "remaining velocity" at extreme ranges, whereby Battle effect is somewhat diminished, the same fractional reductions as were made in the case of infantry fire are applied at corresponding ranges in the one under consideration.

G. REMARKS.—Under the circumstances tabulated, the limits of heavy fire with this gun are seen to be from 100 to 2,000 yards (distinct vision); from 500 to 900 yards

being the zone of deadliest *absolute* effect, while, for the reasons before given, the fire is *relatively* the most deadly up to 600 yards.

Owing to what may not inaptly be termed the surplus effect, therefore, of this gun, the following proposition may not be unworthy of discussion and experiment, to wit: to fire less rapidly at short range, increasing, say, from 200 rounds per minute at 100 yards up to 400, the maximum, at 1,000 yards, and thence maintaining this latter rate at least up to the limits of distinct vision. Several important objects will be thus realized. If the gun is well handled (and at short range there will be less excitement incident to rapidity, and therefore more time for accurate aiming), the same "effect" will be realized at the shorter ranges, and this with far less "lost effect," while at long ranges the already deadly effect may be practically doubled! And if, now, we compare such an effect with that attainable by infantry "in line," and firing at the same long ranges, with average (6 per minute) rapidity and their best per cent. (see Table of Fire "a"), it will be evident that the preponderance of effect is vastly in favor of the Gatling gun! The startling proposition, therefore, instantly suggests itself *to do most, if not all, of our long-range firing with Gatling batteries*. In future wars, this fire must be systematically resorted to, and we submit that the proposition here made offers the simplest and most effective method of realizing it. It means, of course, to increase our number of Gatling guns until we have a Gatling corps as numerous as artillery itself. The first expense is of small moment compared with the *promises* and *results* of warlike preparations, and this method promises not only double the effect with about one half the transportation and expenditure of ammunition, but will enable us to keep our infantry well in hand, and more or less out of the battle until within short range and decisive distances.*

XI. NOTES ON TABLE OF FIRE "c" OF 12-PDR. (LIGHT).

A. Consult the General Notes at the opening of this Appendix.

* As we go to print, we notice that the possible rapidity of fire of this gun has been most wonderfully increased. Unfortunately, it is too late to alter our tables. The new Gatling gun, now on trial before the English Ordnance Board, is reported to fire 1,000 rounds per minute! (At the works, in Hartford, Conn., the rapidity of fire has even been reported as high as 1,200 per minute.) This is two and a half times as rapid as we had found data for allowing. With such a deadly rain of lead, it has thus become *possible* to carry away an entire line of battle, even up to very nearly the limit of distinct vision!

It is almost impossible to keep pace with the improvements now in progress in this branch of our subject, but it is, therefore, more than ever necessary that the soldier should be *indefatigable in professional study and reading*. In our age it is his bounden duty; he can not afford to fall behind-hand in this important matter.

This increased efficiency of the Gatling gun simply intensifies the argument we have just advanced with reference to its employment. To make our table applicable, a multiplier of 2½ (since the rapidity has increased from 400 to 1,000) may be employed, or else Heavy Fire, as recorded in Table N, may be habitually used instead of Ordinary, as required by ¶ 305. (See "Army and Navy Journal," February 28, 1880.)

Such a change, however, is not essential, unless actually demanded as a special privilege at some critical moment. It is certainly doubtful whether the habitual fire of even such a gun need be increased beyond 400 or 500 rounds per minute, and these, too, exceptional minutes. A view to economy of ammunition, coupled with the problem of supply and the securing of the maximum effect out of each pellet, will now govern our studies of this weapon. The limits within which we may experiment are certainly more than ample for its full and satisfactory solution.

B. REFERENCES.—“U. S. Light Artillery Tactics”; Benton’s “Ordnance and Gunnery”; Gibbons’s “Artillerist’s Manual”; Roberts’s “Hand-Book”; “Report of Chief of Ordnance for 1874,” etc.; Ordnance Notes, Reports, Records, etc.

C. CANISTER.—From the very nature of the case, this kind of fire is more or less unaimed. A general direction only is given at the gun; but no control can be exercised over the elementary projectiles which compose each several charge. The cone of dispersion commences at the muzzle, and is more or less regular, the balls fly closely at short range, and Target effect is proportionately high; but, on this very account, Battle effect is lowered, while, for the same reason, as its extreme range is approached, Target effect becomes relatively lower and Battle effect improves. The element of remaining velocity, however, conspires against these influences at both long and short range, and, that of interval remaining constant throughout, the law of change from Target effect to Battle effect becomes for the several ranges tabulated, about $\frac{1}{2}$, $\frac{5}{12}$ +, $\frac{2}{3}$ +, $\frac{1}{2}$, $\frac{1}{3}$, which may be analyzed as follows:

Double canister, within 200 yards	$\frac{1}{2}$	\times	$\frac{1}{2}$	\times	$\frac{5}{4}$	$=$	$\frac{1}{2}$
Single canister, within 200 yards.	$\frac{1}{2}$	\times	1	\times	$\frac{5}{4}$ +	$=$	$\frac{5}{12}$ +
200–300 yards.....	$\frac{1}{2}$	\times	1	\times	$\frac{2}{3}$ +	$=$	$\frac{2}{3}$ +
300–400 yards.....	$\frac{1}{2}$	\times	1	\times	1	$=$	$\frac{1}{2}$
400–600 yards.....	$\frac{1}{2}$	\times	1	\times	$\frac{2}{3}$	$=$	$\frac{1}{3}$

In the above, the first column shows the number of target hits on the “man-spaces,” of which the second column shows the number that are effective, or hit different “man-spaces.” In the third column, remaining velocity is considered; this causes double hits (i. e., of front- and rear-rank men) at short range, and at long range a number of ineffective ones. There is an improved canister for this gun which has given much better results, but it is still experimental (see “Report of Chief of Ordnance for 1874”); with this canister, the results given might perhaps be double those here tabulated.

D. CASE-SHOT AND TIME-SHELL.—(a) *Accuracy* is greatest at short ranges; and is greater for case than for shell, being also maintained to greater ranges by the former than the latter.

(b) *Time Fuses*.—Uncertain and irregular at both long and short ranges, affecting alike the fire of case and shell; most reliable at mid ranges.

(c) *Per cents*.—Are best, therefore, at mid ranges, from 300 to 1,600 yards for case-shot, and from 300 to 1,400 for shell.

(d) *Battle effect* reaches its maximum at from 800 to 1,200 yards for both projectiles. In the reduction from Target to Battle effect, the element of remaining velocity favors case-shot at long range; double hits are also more numerous for case than shell at short ranges; the cone of dispersion does not become normal for either till about 500 yards, the loss of effect from intervals being equal throughout. The above considerations conspire, in the general result, to make the Battle effect of case-shot relatively higher than that of shell at both long and short ranges, and to the maintenance of such effect at its best (as compared with Target effect) over a broader zone for case than shell.

(e) *Comparison*.—While there can be no doubt as to the far greater efficiency, both absolute and relative, of case-shot over shell, the special uses of the latter (it having the maximum of moral effect, and being particularly useful against inflammable cover, etc.), seem to justify its being retained as at least a minimum part of the ammunition of this gun.

E. REMARKS.—Considerable difference of opinion still exists as to the practicability of retaining the 12-pdr. any longer as a part of our field artillery. It has long ago dropped out of the regulation armament of all foreign countries, and perhaps the most cogent reasons we have for its actual retention are the great number on hand, and our fortunate distance from first-class foreign powers. Our older officers seem to be in favor of its retention, they having seen it do excellent service, and urging that it will still find special opportunity for action should the seat of future wars be located, as in the past, in the eastern and more wooded sections of the country. It is further urged that shields might be employed to protect the gunners from the deadly long-range fire of modern infantry upon the field. However, the weight of argument is undoubtedly in favor of its immediate abandonment. Modern progress in artillery improvement has been as marked as in that of small arms, and a comparison of its results with the best realizations of the light 12-pdr. weighs decidedly against the latter in every element—accuracy, rapidity, range, and effect. At its own mid ranges, its absolute effect is higher than that of the 3"-rifle, but it must be remembered that this latter gun is by no means a *modern* field-piece (though at present *our* best one); and, also, it should be noticed that even this argument in favor of the 12-pdr. is simply one of *caliber*, and not quality.

XII. NOTES ON TABLE OF FIRE "d" OF 3"-RIFLE.

A. Consult the General Notes at the opening of this Appendix.

B. REFERENCES.—"U. S. Light Artillery Tactics"; Benton's "Ordnance and Gunnery"; Roberts's "Hand-Book"; "Report of Chief of Ordnance for 1874"; "Ordnance Notes," Nos. li, lxxxix, xcvi, 105, 112, 113, 119.

C. CANISTER.—(a) See note on Table of Fire of 12-pdr. There are two kinds of regulation canister for this gun, one having 100 balls, the other, 150. In double charges, we have supposed two of the smaller canisters to be employed.

(b) Comparison with the Table of Fire of the 12-pdr. will show that the percentage of hits is lower for 3"-rifle canister than for that of the 12-pdr. This arises from the fact that the iron balls of the latter have a far better ricochet. Comparisons of the Battle effects in the two cases will also show that, while that of the 3"-rifle is absolutely the greater, that of the 12-pdr. is relatively so, which arises from the far better dispersion, greater number of double hits, and the well-retained remaining velocity of the 12-pdr. canister.

(c) *Remarks*.—One of the greatest drawbacks to this kind of fire (canister) is its limited range, with a view to remedying which, and following a suggestion derived from the efficiency of the "wired cartridge" used in shot-guns, a very noticeable improvement in the construction of canister has been made. This consists in having the charge of balls surrounded by a compressed spiral wire, which, upon the discharge, is projected forward with them and acts as a sort of cage, tending to keep the projectiles more together during the shorter ranges. The dispersion is thus made to commence at a greater distance from the gun, and the effective range is said to be thus practically doubled. Experiment with this new canister has given excellent results, and seems to recommend the wiring of a due proportion of canister for use at from 200 to 600 yards' range, with a view to effectively spanning over the gap between the zones swept by our present canister and case-shot fires.

D. CASE-SHOT AND SHELL.—(a) *Accuracy* is best at short ranges, and high; it is

about the same for both projectiles up to 2,500 yards, after which it favors the heavier (case-shot).

(b) *Fuses*.—These for the case-shot are *time*, and are irregular and uncertain at short and long ranges, but are very accurate at mid ranges. The percussion fuse is generally employed for the shell; it is good, and about equally regular and certain at all ranges. In foreign services, the time fuse has attained wonderful accuracy and certainty.

(c) *Percentage*.—This, though better for shell than for case at short ranges, favors the latter from 900 to 2,500 yards. From the very way in which explosion is brought about in percussion shell, many valuable fragments are immediately buried in the ground, whereby its percentage of hits is, of course, considerably lessened, especially at long range.

(d) *Battle Effect*.—Best from 500 to 1,600 yards for case-shot, and from 300 to 1,200 yards for shell, reaching its maximum at 1,100 yards for the former and at about 700 for the latter. The effect is good, however, up to 3,000 yards for case-shot, and to about 2,500 yards for shell. (See Corresponding Notes and Remarks under head of Table of Fire, 12-pdr.)

E. REMARKS.—That a better future is in store for this gun and its next in caliber (the $3\frac{1}{2}$ "-rifle) may certainly be predicted from a study of the report of the Chief of Ordnance for 1879, where we find that the $3\frac{1}{4}$ " M. L. Rifle (Dean bronze) gave at 1,760 yards (1 mile) 6 hits out of 7, or 88 per cent.! If that fire is continued to be realized, proper multipliers must be introduced in studying the effect of these improved guns. The fact is, that the continual change and improvement in all classes of arms make the subject of Casualty in action the most difficult of all to tabulate.

XIII. NOTES ON TABLE OF FIRE "e" OF HOTCHKISS REVOLVING CANNON.

A. Consult the General Notes at the opening of this Appendix.

B. REFERENCES.—See "Ordnance Notes," xciv; "Report of Chief of Ordnance for 1877-'79."

C. RAPIDITY OF FIRE.—In the tables this has been taken as ranging from a maximum at 100 yards down to the average heavy at 1,000, beyond which it is maintained at the latter rate up to extreme range.

D. FRAGMENTS PER ROUND.—The number allowed (8) is rather smaller than claimed (10) as possible, only 9 having been allowed in the case of the much larger 3" projectile, the small difference thus established between the numbers of fragments in these two cases being due particularly to the fact that, though the latter is very much the larger, the former is far better *arranged* with a view to regular and effective bursting.

E. ACCURACY AS TO AIM.—This is always high, and gradually decreases as the range increases. (100 per cent. at both 500 and 1,000 yards was obtained April 16, 1879; see "Report of Chief of Ordnance for 1879.")

F. FUSES.—As to certainty, they are about equally regular and certain at all ranges. The Hotchkiss percussion fuse is perhaps the best of its order manufactured. (See Appendix S² to "Report of Chief of Ordnance for 1878.")

G. PERCENTAGE is therefore high, and gradually decreases as the range increases, keeping rather higher than corresponding 3"-rifle per cents., and somewhat below Gatling per cents., the latter being unaffected by fuses.

H. BATTLE EFFECT. (a) *Intervals*.—Thirty yards of interval are taken as most suit-

able to this gun when "in battery," in order to utilize its deadliness to the best effect. The automatic horizontal dispersion being only some 3° , if a much smaller interval were allowed, the guns would soon create their own "dead space," and then fire and cross-fire to no purpose through it. As we widen the intervals, however, within due limits, we project to a greater distance that range at which the cross-fire commences, and a battery sweeps a continuous front, while within this range the natural "dead spaces" can be effectively neutralized by independently traversing each gun, and with far less lost effect. When fired at its best, this gun, like the Gatling, is so deadly and rapid in its work that the portions of a line of battle covered within 600 yards run almost certain chances of being wholly swept away. The relative loss of effect on account of the intervals in the exposed lines is, of course, about the same as in the case of the 3"-rifle, but the absolute loss is far greater up to say 600 yards, on account of the narrowness of the front actually swept and its speedy destruction.

(b) *Dispersion*.—Owing to the bursting of the projectile itself, the natural dispersion due to the oscillation is somewhat increased. The result for equal arcs of oscillation is consequently better than for either the Gatling gun or the 3"-rifle.

(c) *Remaining Velocity*.—As in the case of the 3"-rifle, this element weakens at very long range, and the Battle effect is thereby somewhat diminished.

(d) *Double and Waste Hits* are very numerous at the shorter ranges, and, therefore, the same remarks as were made concerning the surplus effect, in the case of the Gatling gun, apply with equal force to the case under consideration. The figures in the column of Battle effect are a final compromise between the various elements above noticed. Up to 600 yards they are taken *between* the numbers that would be exposed and undoubtedly swept away, were the guns fired without traversing save their natural (3°) oscillation, and those actually in front of the battery, and which *can* be covered by such extra traversing, and favor the former inversely with the range. From 600 to 900 yards the effect becomes equal to the number of men actually exposed in front of the battery without extra traversing, and beyond this latter distance becomes normal, and is governed and modified as in the cases already noticed.

I. REMARKS.—This gun is provided with steel shields to protect the gunners. Besides the percussion shell, it fires a case-shot, understood to be very efficient, but concerning which no full data have been obtained. The report of the Ordnance Board upon this gun characterizes its case-shot fire as "similar to that of other cannon," and, since it has been found abroad (see "Ordnance Notes," lxxxiv) that case-shot fire is about "ten times as great from the same guns as that of common shell," some idea may be formed of the power of the Hotchkiss Revolving Cannon in this particular, by multiplying the effect given in Table E by at least 5. But even such a low multiplier as 5 can not be employed at short (within 600 yards) ranges, save as an indication of certainty to put *hors de combat*, since the shell fire itself (when at its best) is already more than sufficient to sweep away the opposing line. From 600 to 2,500 yards, the multiplier may, however, be allowed to increase gradually from 1 to 5, beyond which it should certainly be allowed to remain constant. It should also be noticed that the greater "remaining velocity" of case-shot at long range will also tend somewhat to improve its Battle effect beyond 2,500 yards.

From a calm survey of the whole subject, there can be little doubt as to the vast superiority in *killing* power of the Hotchkiss Revolving Cannon and the large caliber Gatling guns over any field-gun (single loader) now known to artillery, or that is

likely to be developed. They have shown that the *machine* breech-loading field-piece is a successful realization, and that the class to which they belong can always maintain its superiority over single-loaders of equal range and considerably increased caliber. It would, of course, be vain to predict the limits of improvement to either class, but it certainly requires but little discernment to see from present indications that the race must always favor the machine.

Artillery, as such, with but three exceptions, is said to have contributed to no victory and prevented no defeat in the late Russo-Turkish war; it has signally failed of late to come up to the expectations of its most earnest advocates, and many reasons, both good and bad, are given explanatory of this failure. It has, perhaps, been due more than all else to the fact that it has had to compete with small arms that have been, relatively speaking, far more improved. It has often been practically *hors de combat* ere it has gotten fairly into action. We have in turn seen, particularly in this unequal contest with the improved small arm, the solid shot discarded, the canister reduced to the ridiculous number of barely "two per gun," and now, as a final lesson from Russo-Turkish experience, the shell itself so far outstripped by the shrapnel in the struggle for retention, that, according to Lieutenant Green, its use is soon likely to be almost as obsolete as the employment of solid shot. But how will it fare with even the best single-loading field artillery, when in future wars it comes into combat with the long-range machine gun, as an auxiliary to the already too powerful infantry fire?

As the matter now stands, the Hotchkiss Revolving Cannon and the Gatling guns of all calibers throw over five times the weight of metal in the same time, and this with far greater ease, accuracy, and continuity, than the 3"-rifle, the extreme effective range being practically the same. Shall we discard the latter? We certainly do not advocate any such extreme measure as this. There are several special, though perhaps only occasional, uses of great moment upon the battle-field for just such guns as the 3"- and 3½"-rifles, and the far better foreign guns of this class, which render it as impracticable to leave them entirely out of our armaments as some maintain it is to discard the saber and the bayonet. But does it not seem equally reasonable that their day of first importance has gone? Must not the artillerist now turn to such guns as the Hotchkiss and Gatling, if his "arm" is to exist longer as a necessary and valuable component of armies? Is not Battle effect, i. e., the power to put *hors de combat*, or, in pure and simple English, *to kill*, the real criterion of all armament? If so, we must re-arm our artillery as thoroughly as we hope to do our infantry. We must do it judiciously, and must *anticipate* the future.

To do this, we certainly stand in a most favorable position. With no system of our own to blind our eyes, and unpledged to any foreign system, we stand free to choose among them all, to select of each, in fact, the latest, the deadliest, and the most promising.

XIV. We select, without further remarks, from Frazer's "Gold Medal Essay," of May, 1879, several interesting tables ("f," "g," and "h") bearing upon the subject of Casualty in action, and which, coming freshly from so independent a source to justify our own conclusions, can not fail to be of interest. In this connection, we would also call attention to Fig. 16, Plate VII, which is taken from the same authority. A comparison of this diagram, with the data presented in the Tables of Fire that

are now under discussion in this Appendix, will also lend credence to our own conclusions.

Through the courtesy of L. R. Hamersley & Co., of Philadelphia, Penn., we also reproduce in full the following valuable article on "Loss in Battle," by E. Henry Lacombe, which appeared in the May (1880) number of the "United Service Magazine." We had prepared a somewhat similar table, but these are so full in their treatment of the subject that we gladly avail ourselves of the privilege of using them. They will prove of special value to the advanced student of Strategos in studying Campaign Games where only *general* percentages of loss are desirable (see ¶ 387), besides being a most valuable acquisition to our present collection of military statistics:

LOSS IN BATTLE.

"The 'Saturday Review' recently advanced the hypothesis that after a few more improvements in firearms there will be no more battles. Practically this seems to have been the result of improvements in the weapons used in naval warfare, for neither the Franco-Prussian nor the Russo-Turkish war produced a naval battle, although the combatants had all squandered vast sums of money on improvements in their naval force. Knowing that, when these forces were marshaled for battle, they might, under certain contingencies, be *exterminated*, they forbore to run the risk of exposure to hopeless destruction. Such, says the 'Review,' will be the ultimate result of contests between nations possessed of armies, equipped with the probable inventions of the next half century. War will assume the character of a game. When two armies face each other, one of them will realize that an assault upon the other imports the practical extermination of the attacking force, and will gracefully throw up the sponge.

"Without admitting the truth of this hypothesis, it is certain that each marked improvement in destructive weapons is—paradoxical though it may seem—the cause of a decreased loss of life in battle. The 'Review' published some tables to prove this, but they were not very full; those given in this article are more extended, and may prove of interest. The more prominent battles of the last two hundred and fifty years are grouped into four periods, and the average percentage of killed and wounded to the total force engaged, so far as it can be ascertained with reasonable accuracy, is stated. No effort at a selection to support the theory has been made. The list is restricted to engagements in the field, attacks on fortified places being omitted. Some pitched battles (such as Waterloo) which do not appear on the list are omitted for the reason that sufficient accuracy in the statement of loss does not seem obtainable from the materials accessible to the writer.

"The first period [see Table "i"] extends from the time when the use of firearms became general to the introduction of the iron ramrod and the bayonet. During this period the infantry was divided into about equal numbers of pikemen and musketeers. They were formed ten deep (pikemen in the center and musketeers on the flank), because it was found that, when the front rank had fired, it could reload by the time nine other ranks had come to the front and fired. The musketeers wore over the shoulder a bandelier of broad leather, with a dozen charges fastened to it in horn or wooden cases, which were suspended by long strings, so that they could be readily brought to the muzzle of the piece; the musket barrel was four and a half feet long. Attached to his girdle the soldier carried a bullet-bag, containing molds, bullets, worms, screws, and priming iron. He also carried his scouring stick, with horn rammer at one end and a

screw at the other for the worm. In the right hand he carried his rest, of ash-wood, with an iron spike at one end to stick in the ground and a half-hoop of iron for the musket to rest upon at the other. Gustavus Adolphus substituted cartridge-pouches for bandeliers, abolished heavy rests, and formed his men in files six deep; but the old fashion prevailed in England down to Naseby, when Fairfax first superseded bandeliers with pouches, and introduced a lighter musket-rest, of iron tubing covered with leather. Exactly how the solid *tertias*, ten square, in which the infantry was formed were managed on the field is a puzzle to modern experts. Did the pikemen stand like lambs, presenting a fair mark for the muskets of their foes? And when it came to push of pike, what became of the musketeers, exposed without a hand-to-hand weapon, on the flanks? *

"A noticeable feature of this period is the large proportion of *killed* to the entire amount of casualties. At Marston Moor, although it seems improbable that the entire loss was any greater than that stated in the table, the country folk told Ashe that they buried four thousand bodies on the field. At Lutzen, Wallenstein and Pappenheim left nine thousand dead on the field; and of the Swedes, the entire Yellow regiment lay on the ground in order where they stood before. At Rocroy, the 'incomparable Spanish infantry' was annihilated: of eighteen thousand engaged, nine thousand were killed in their ranks. 'How many of you were there before battle?' asked a French officer. 'You have only to count the dead and the prisoners,' was the reply. This was owing in part to the awkward mode of formation before alluded to, and also, no doubt, to the horde of camp-followers, who swarmed over the field after an action, plundering friend and foe alike, and poniarding all who had life enough left to resist.

"Between the first period and the second [see Table "j"] there is a space of seventy years, of which no account is here taken, as the one glided imperceptibly into the other, the plug bayonet having been substituted for the pike in the English army in 1672, and the iron ramrod being the invention of Leopold of Anhalt-Dessau, the 'Old Dessauer,' early in the eighteenth century. The infantry arm of the second period is familiar to all: it was the old 'Brown Bess' smooth-bore flint-lock, with bayonet.

"The Wilderness campaign is omitted [see Table "k"] by reason of the difficulty experienced in accurately distributing the numbers engaged and the casualties on the Confederate side for each separate engagement. The Union losses, from the date that the army crossed the Rapidan, May 4th, to the 3d of June, when it refused to renew the attack on the lines at Cold Harbor, was—if we assume the total strength for the campaign to have been 190,000, as seems to be conceded on all sides—far in excess of the average.

* We are fortunate enough to have examined a rare work on the "Art of War," published in 1682. It is a very well-preserved copy of the tactics of that period, copiously illustrated, not only with diagrams, but also with very graphic pictures of the formations of those times. This book shows that the pikemen of the day formed ordinarily upon the flanks or centers of the large "bandes," or companies, while the musketeers were engaged in using their weapons, the formation then being in very open order. When, however, the combat closed to hand-to-hand distances, the musketeers retired to the center through the intervals, and each "tactical unit" formed a closed and solid square, or rectangle, so as to present upon all sides a bristling array of pikes, many files deep. The passage from one order to the other was effected by methods and words of command, which evinced as full an appreciation of the value of drill and tactical detail as we have in our own day.

Wilderness—Killed	5,697	
Wounded	21,463	
	<hr/>	27,160
Spottsylvania—Killed	4,177	
Wounded	19,687	
	<hr/>	23,864
North Anna—Killed and Wounded		1,683
Cold Harbor—Killed	1,905	
Wounded	10,570	
	<hr/>	12,475
Total		<hr/> 65,182

"In preparing a tabulation such as this, it is not an easy task to pick out from the total loss of an army the number of killed and wounded with any assurance of accuracy. It may be well, then, to refer to the authorities from a comparison of which the above statements are prepared. Though there may be errors in them, they are believed to be so nearly accurate as to fairly bear out the proposition they are adduced to sustain. For the fourth period, the 'Précis of Modern Tactics,' by Major Home, R. E., has been relied on, except as to Sedan, which is from the German official report. The figures in the third period, are from Hozier's 'History of the Six Weeks' War,' Kinglake's 'Crimea,' 'Civil War in America,' by the Count de Paris, Draper's 'Civil War,' and Taylor's 'Four Years with General Lee,' checked by the official list of casualties in the 'Medical and Surgical History of the War,' and the Confederate muster-rolls, as published in Dawson's 'Historical Magazine.' For the early periods the authorities are Napier, Alison (the last edition), Jomini, Carlyle, Markham's 'Life of Fairfax,' Mahon's 'Life of Condé,' Harte's 'Gustavus Adolphus,' and Schiller's 'Thirty Years' War.'"

XV. Major Frazer states that, "as regards the *small arm*, the time has not yet come for the introduction of a repeating rifle; though that it will come there can be little doubt, because of the great advantage it will confer at that supreme moment when a nightmare holds men's hands in loading." We feel, however, on the other hand, that the time has come. Austria is now trying a repeater, and in our own country the Lee and Hotchkiss magazine arms are competing for adoption. The whole weight of evidence goes to show that attacking troops are not deterred by long-range fire, even though accompanied by a loss of half the effectives of those thus advancing. The "Queen of Battles" (infantry) must then possess a queen of weapons, if she is to maintain the vantage against attacking troops in that last stage of every effort, the "final rush."

XVI. In this connection we may be pardoned for repeating in brief an interesting and almost prophetic dream, related to us some time ago by a well-known army surgeon (Dr. V. B. H.). It occurred as far back as 1872, long before Kearney appeared as an agitator or the Chinese had become so dreaded by the Pacific-slopers:

"It seemed that a terrible struggle of races was in progress; it was a war *d'outrance*. Myriads of Mongolians had landed upon our coast, and an endless fleet of junks and rude barbarian crafts of every description continually reënforced the vast army of inva-

ders. America, fully awakened to the magnitude of the invasion, and to the desperate chances involved, had risen as one man to meet the issues. The struggle was to be one of existence, for the Mongolians had profited by their intercourse with their civilized neighbors, and it was understood had, with true Celestial aptitude, copied all our arts in the interior of their closely guarded empire, and were now sallying forth from the lands that had at last become 'too strait' for them, armed and equipped like Europeans, and in hordes as countless as the sands of the sea.

"A vast American army was collected together, and in the best array, and, commanded by the first military talent of the country, had taken up its position in the interior. When the army of Mongolians at last came into view, it was noticed that they had arranged themselves in a quincunx order, extending far to their rear and beyond the limits of sight. The mind instinctively carried this awful array back to the very shores of the Pacific, upon which their endless hordes were ever disembarking. Their onward movement was like that of a vast machine, a perfect horror of tactical precision and blind obedience. The vast army seemed to be actuated by the same impulse which sends an army of ants onward in spite of fire and water, and smotheres all opposition with the very bodies of 'forlorn hopes,' 'sacred bands' that lead the rest.

"Far back in the distance, dimly descried by the best glasses in our army, one who seemed a military mandarin of highest rank at length made a signal, which was quickly repeated by others throughout the mass, and from the nearest ranks a word of command was faintly distinguished by our most advanced pickets. It sounded like 'Cobah,' and was apparently some order similar to our 'Forward!' or 'Ready!'

"On they moved, with dreadful, fascinating precision. They were yet far beyond the range of any of the weapons of the main army, and seemed to pay no attention to the fusillade that our skirmishers and outposts, located far in advance, sent among them. The smoke of their friendly arms could be readily seen, but their report could hardly be distinguished on account of the distance.

"At last the irresistible advance swept over these devoted lines of skirmishers, and with direful significance to our main army, still too far back to use or waste its ammunition, the smoke of their hopeless resistance died away only to show the continued onward and unchecked movement of the barbarians.

"And now another signal was made by the central chief, and duly repeated right and left as far as the eye could reach. At this signal each Celestial, without in the least altering his peculiarly swinging gait, that could now be almost individually distinguished by the motion of the whole mass, turned to his weapon, and borne upon the air toward us was heard a faint murmur like the word 'Ching,' repeated in unison by the myriads of the host before us. With every step they took, this word was uttered—'Ching Ching, Ching, Ching!'

"At the next signal from the mandarin, the line of pigtailed in his immediate vicinity opened fire *into the air*. This peculiar tactics was astonishing, but soon explained itself. The 'firing line' was just far enough in rear to sweep a zone commencing about 300 yards in front of the most advanced line of the attacking army. This zone had, from the distinctly visible fall of the projectiles, a dangerous width of some 500 yards.

"Again a signal was given, at which another line, the next in front, took up this fire, and then the next, and next, and, with each successive addition to the widening firing line, the belt of dangerous space leaped, as it were, toward us almost by bounds,

while the whole area swept by the spatter of that 'rain of death' kept constantly approaching with the onward motion of their advance.

"As their nearest ranks opened fire, we could distinguish indistinctly the nature of their weapons, and excited imagination filled up the description. It flashed upon our lines almost at once. 'They all have Gatlings!' was the subdued remark muttered along the front. Then came the order, passed along our lines, to 'hold fire until the now rapidly approaching zone should get within a hundred yards.' Word was also passed along, to encourage us, that 'their ammunition would give out!' So, with bated breath, mid awful strain, we held our fire and waited.

"But a new change in their tactics now appeared, and one of boding significance. The widening belt of their firing line had barely reached the front ranks of their army, when these ranks halted, continuing, however, their fire unabated. Rearward on the distant hill-tops we could see that the motion did not cease, but the low-lying smoke concealed the movements going on immediately behind the front and now stationary lines of Mongolians.

"At last, some one in our ranks, catching the purport of their tactics, and assisted by the wind, which, for a moment, carried the smoke from off a part of the field, exclaimed, 'They are effecting a passage of lines!' And, surely enough, we soon saw, advancing between the stationary mouths of flame that marked each halted Celestial, other mouths in motion. At length, the new lines emerged from the intervals of the front line, and, without halting, continued the deadly advance as at the first, and those relieved fell back to replenish their ammunition, or to be in turn relieved by others further back, as the vast process of unrolling should reach them.

"The zone of death now crept toward us; the air was disturbed as by a cyclone, and the sward sank beneath the hail of lead as though before a scythe. Our lines could be restrained no longer; instinctively they opened fire. It was none too soon, for, with a rush like that of a tornado, the hostile fire reached our ranks. The observer, stationed with a group of staff officers in the rear, could see the front line wither at its guns. The gaps their feeble efforts made in the ranks of the enemy were quickly filled by those continually pressing to the front, and, as the remnants of our first line at length fell back upon the second, it, too, in useless effort, plied the advancing hosts with shot and shell, with musketry and mitraille, and yet, amid the havoc that it wrought, it suffered worse. The wild frenzy of the battle now reached the third line. Here the same scenes were enacted, and the same relentless fate doomed all its efforts useless.

"Bleeding beneath a gun, where he had fallen, the narrator lay in a semi-conscious state, and heard at length the onward tread around him of the foe, heard the monotonous 'Ching, Ching, Ching,' with which they still kept unison to march and fire, and consciousness then left him."

In the above dream, the prophetic part is hardly to be put upon that which relates to a "Battle of Dorking" with the much-abused Mongolian; but who shall say it may not faintly grasp some of the tactical *possibilities* of that awful warfare of the future, whose deadly arms, inexhaustible supplies, and relentless control of electricity and the higher explosives, and whose utilization of all the infernal mechanisms of human military ingenuity, shall tend toward a battle like to that alone of Armageddon?

CONCLUSION.—At the present time the military world is truly in a most critical transition period.

While Heavy Artillery is straining every power of nature to fabricate enormous guns, Engineering is taxed in all her skill and genius upon the counter-questions of more permanent defense. New explosives are harnessed to new machines, and the most recent offspring of the terrible torpedo brood, shunning its appropriate element, and essaying the air itself, leaps forth upon its errand of destruction from the cannon's mouth! * From the nightmare of experiment that these efforts are suggesting, the very air seeks the relief of vacuum, and the ocean, unable to escape, quivers with anticipation as monster after monster, each one more horrible in deformity, and more instinct with infernal potency than its predecessor, launches with accelerating sequence into her troubled bosom.

Every "arm of the service" is perplexed with new problems of the utmost tactical importance, and doubt and confusion preside over their investigation. With Cavalry and Infantry, the question, long since supposed to have been buried with the Crusaders, of defensive armor, as at least some protection against this deadly modern long-range fire, is looming up, and the dispute about the *saber* and the *bayonet* still remains unsettled.

Field Artillery has witnessed the successive abstraction of solid shot, canister, and shell from her astonished limbers, as each in turn has been pronounced of hopeless efficiency; and now the very guns themselves, the "single" muzzle and breech-loading cannon of the best patterns, are threatened by "machine" guns, as but lately rifles and breech-loading small arms threatened and drove into the curiosity shops the good old "Brown Bess" of our fathers, and as to-day the magazine arm threatens in its turn to displace them. Nor does the confusion end here, for Infantry, still in doubt and excitement over this long-range controversy, and burdened down with an overload of ammunition, is now urged to add to its "marching weight," not a trowel—matters are far more desperate—but the *pick and shovel*, and to cling to them as to their rifles—as to their lives!—it almost seems as if wherewith to dig, if not their graves, then, at least, *the very last trenches of human warfare!* For where shall this matter end short of universal demoralization? Is it not rapidly pushing us on toward the realization of the dream of "the Society for the Promotion of Permanent and Universal Peace"—toward general disarmament?

But, however convinced we may be that warfare is now big and far advanced with the pregnancy of everlasting peace, of *necessary peace*, we can not resist the instinctive convictions of mankind that its birthday will be one of terror and dismay.

The "age of iron" has now gone into history, and Bismarck has characterized our own as one of "*blood and iron*." We are told that Daniel foresaw and called it, more significantly, one of "*iron mixed with clay!*"

The storm must come; it gathers upon every side; its no longer uncertain mutterings warn us it may burst at any moment, with its center everywhere. We only learn our lasting lessons by experience, and the world must learn this most important self-set lesson in a manner never to be forgotten. The path to lasting peace lies through the storm-belt that now surrounds humanity.

During the past fifteen years the Continent has strained every nerve in military exercise, and has already exhausted the ransom of a planet in perfecting the direful arts of war. Her military expenses increase yearly. There are no signs of retrenchment,

* See "Army and Navy Journal," vol. vii, p. 589, and October 4, 1879.

save that in all other branches of her polity she stints her burdened peoples, in order that the forge of Vulcan may burn more brightly.

In the mean time, who among the other nations of the earth can afford to watch this brewing hurricane with idleness and unconcern, and without any preparation? Surely no *Anglo-Saxon* people. This is to be a struggle for existence. Its seat, indeed, may be upon the shores of the Old World, but the winner will "possess the earth" even as it was promised to Israel of old, and it matters very much to us, in spite of our far remove from European strife, *who* that winner is to be. In the changing fortunes of such a universal struggle as yearly becomes more probable, it is rash to indulge in simple *assertions* that "America will not be involved." It is far wiser to admit, as at least a remote possibility, that the very interests of such a people as ours has now become *may*, perhaps irresistibly, draw her into the conflict, and to bethink ourselves beforehand of all the bearings of these interests, lest we rue in vain, not indeed lost opportunities for senseless conquest, but the loss of security itself to those institutions which are now not only American, but far more widely Anglo-Saxon! While, therefore, we would not for an instant counsel the same dreadful waste of resource with which the ambition of monarchs burdens the Old World, yet we would most urgently advocate, at least, *a constant and generous expenditure from our ample and surplus wealth* in honest preparation, that we may be always in readiness for every contingency. At the critical moment we shall thus find ourselves in the certain possession of the world's *balance of power*, a power with which to lock or open, as may then seem best for the great cause of human liberty, the exhaustless treasure-house of the New World. It is preparation only that can secure to us that independence which in the future near at hand will be the key to destiny.

APPENDIX G.

A COLLECTION OF TABLES GIVING CERTAIN GENERAL MILITARY STATISTICS; ALSO, SPECIAL INFORMATION CONCERNING OUR OWN ARMY.

WE are forced for want of space to submit the matter contained in this Appendix without special remarks, save the brief notes annexed to some of the tables contained therein.

The interest in *military statistics* is but just awakening in this country, and we are at present in want of accurate and reliable data upon almost every subject that demands consideration at the outbreak of war. These subjects are of vital importance to a nation at all times, and demand a special place in the *census* of its resources. America, from her wealth, her energy, her *ingenuity*, is probably to-day the most powerful nation on the globe, or rather, should we say, she has the *capacity* to become so by the simple effort of arousing herself. To-day she is ignorant of herself. That her resources are gigantic, she is certain; but where they lie, how soon they may be developed, and to what extent, she can not tell.

A decade of census gatherings has passed over our country, and with it four great wars have piled up their volumes of statistics in her archives, yet to-day the military profession is still without a place of *special recognition* in the national census.

Moreover, *within the profession itself* we are in need of carefully worked-out *details*. These are the most neglected of all the subjects of military study, and yet they, of all others, are those that in the day of need are at once imperatively demanded, and for want of which any nation that relies upon hasty improvisation in the midst of affairs is almost sure to go astray.

The materials for the most comprehensive tables upon Organization, Administration, Transportation, Subsistence, Recruiting, Arming, and Munitioning, Clothing, Communicating, etc., exist everywhere about us, and for the full arrangement of all the details of these subjects, conveniently for immediate use, there is needed only *the special study of individual students*.

It is the province of a Game of War to induce soldiers *to think in time of peace*; in fact, to induce them *thus*, by the collection and study of statistics, to *prepare for war*. Germany has done this for a century, and has she not been amply repaid?

Let American soldiers come to this task willingly, and who can foretell the resources of preparation that may not be developed?

It should be felt in this connection that here is field enough for all to work and to assist, and that he who has added but one *fact* to the grand collection, or has formulated but one subject, has done his country a service that will be fully appreciated in the day of mobilization.*

* See "Army and Navy Journal" for February, 1880, and "United Service Magazine" for July, 1880.

APPENDIX H.

MAP COPYING.

THE Blue-process of copying maps and diagrams is so useful, and its application so simple, that the following brief notes will enable any one to become skillful therein, with a very limited apparatus.

The object of the process is to obtain a sun-photograph. Any drawing made upon ordinary tracing cloth or paper may serve as a "negative," and an indefinite number of exact copies thereof be very expeditiously transferred to paper prepared as follows:

Any good hard paper which will bear the necessary wetting may be prepared to receive the photograph (from the leaf of a press copy-book to a Bristol board).

Sensitizing Solution.

1½ oz. citrate of iron and ammonia.....	} dissolve.	} <i>Mix this, and keep in a yellow bottle or away from the light.</i>
8 oz. clear water.....		
1½ oz. red prussiate of potash.....	} dissolve.	
8 oz. clear water.....		

To Coat the Paper.—Use a sponge 4" in diameter having one flat side.

1. Go over the paper once with the sponge quite moist with the solution.
2. Go over a second time with sponge squeezed very dry.
3. Put away to dry in a dark place (a drawer, closet, etc.), and thus keep till ready to use.

When dry, the paper should be a full yellow or bronze; after exposure to light, a dark bronze—the lines of tracing are *still darker* on the surface.*

Upon washing the paper after exposure to a tracing, the characteristic blue tint appears with the lines of the tracing white, in vivid contrast.

To make a copy upon such a prepared surface, the following materials and process are necessary:

1. A flat board as large as the tracing.
2. Lay upon it for a backing a mat of blanket, or its equivalent.
3. Lay upon the blanket the sheet of sensitized paper, its prepared surface turned up.
4. Lay upon this the tracing, smoothed out.
5. Lay over this a sheet of glass (clear and heavy).

* This paper can be procured in bulk of large dealers in drawing materials at a moderate cost per yard.

6. Expose to a clear sunlight from 6 to 10 minutes.
7. For clear skylight only, expose 30 to 45 minutes.
8. On a cloudy day, one hour to one and a half hours, will be necessary.
9. Remove the prepared paper, drench it freely for one or two minutes in clear water, and hang up by one corner to dry.

The post carpenter can easily make a box frame having a back which may be clamped tightly against the glass, and with such an apparatus the carrying out of the details of the process may be greatly facilitated.

APPENDIX I.

FOR DECIDING RATIOS BY A 12-FACED TEETOTUM.

WHEREVER applicable, the table contained in this Appendix may, perhaps, be found more convenient for deciding ordinary ratios than either of those (J or K) given in the body of the text. It will be found to comprehend all simple ratios whose larger term does not exceed 11. The principle upon which it is based is the same as that employed in the construction of Table J, it being made, however, to conform to the throws of a twelve-faced die, instead of the ordinary one of six faces. An examination of the table will show that the + sign has been employed to indicate those faces pertaining to the larger term of the ratio in each several case, the — sign referring to the smaller term. The table may be employed by reference to the following simple rule:

Rule IX. Spin the top once. Should the square below the ratio under consideration and in the line opposite the face of the top which turns up contain a + sign, the side favored by the *larger term* of the ratio wins. If it corresponds to a — sign, the side to which the ratio is *adverse* is the winner. Should the face correspond to a blank square, the spin will be repeated immediately.

APPENDIX J.

AIDS TO CALCULATION.

THE history of mathematics notes the invention of various mechanical devices, whose object has been to simplify the application of its elementary rules to complicated cases. The famous Babbage machine is perhaps the most elaborate of this class of instruments, but has been followed in our day by a vast number of simpler ones, which are found more or less convenient in special calculations. To Captain William R. Livermore, of the U. S. Engineers, is due the credit of advising the employment of some such instrument in the many calculations involved in the playing of the War Game, and of inventing a very simple means of effecting such operations. While we are not fully satisfied as to the necessity of such an instrument, and for our own part find the calculations requisite in employing the Table of Multipliers most rapidly performed with the lead pencil alone, or even mentally, we are nevertheless induced to offer the following instrument as an assistance to such as are convinced of the value of the new method. This instrument, however, will only be furnished with the complete outfit of Strategos, as it is by no means an essential part of the War Game, and, like all others of its class, can, at best, afford only an approximation to results which may be obtained more accurately by direct calculation, assisted by cancellation, etc. A study of its principles, as herein described, will suggest to those impressed with its value many additional uses and certain simplifications in its employment which we have not space to notice.

The Sounding-board.

This is a contrivance for multiplying and dividing by means of *sound*. It is based upon the principle that the logarithm of the product of two or more numbers is equal to the algebraic sum of the logarithms of such numbers. The instrument consists of a dial, around which is arranged a logarithmic series of numbers, the spaces between them being marked by vertical pins placed upon an exterior arc. An index arrow, A B, is pivoted at the center, C, of these concentric circles, and may be moved by means of a handle near its other extremity, so as to point to any part of the inner circle of the dial. The handle of this arrow is provided with a spring tongue, T, which projects beyond its point far enough to reach the pins arranged around the exterior arc, and to *click* as it passes such pins, or to retain the index in the corresponding spaces until forcibly moved elsewhere.

The series of numbers arranged upon the inner arc is derived from the equation $y = (2 \log. x) 10$, in which x = any number used as a factor or divisor, and y = the

corresponding number of pins. Thus, let $x = 2$, then the $\log. x =$ taken to two places $= .30$; $2 \log. x = .60$; and $y = (2 \log. x) 10 = 6$. Therefore, to *multiply* by 2 upon such a board *click forward* (i. e., with the hands of a watch) 6 pins. Suppose, for instance, the arrow pointed at 112; to multiply by 2, click forward 6 pins, and the arrow will be found pointing to 224. Conversely, to divide 112 by 2, *click backward* 6 pins, and the index will be found opposite 56, etc.

The logarithmic key to this instrument is found thereon, the factors being arranged above the figures indicating the corresponding number of pins to be passed. The instrument is also arranged so that it can be employed with great rapidity by using the *eye*. For this purpose every 5th space is marked with a *, the intermediate spaces being marked respectively I, II, III, and IV; every 10th space is further marked with *. By reference to these "marks," it is easy to see at a glance, and without counting, the space into which the arrow must be put in order to correspond to any number of pins forward or backward. To employ this instrument, therefore, we have either of the two following rules, according as the ear or the eye is to be relied upon:

Rule X. To multiply or divide by *sound*: Place the Index at that number (or a convenient fraction thereof) which comes nearest to the "tabular effect" taken from either of the several tables of Casualty. Then move the Index by the handle, forward or backward, a number of *clicks* corresponding to each several multiplier entering into the case (Table R), attending with the ear only, and employing the eye to consult the map or the said Table of Multipliers, as the case may be.

Rule XI. To multiply or divide by the *eye*: Place the Index as before; then, assisted by the "marks," run the Index forward or backward to the space corresponding to the number of pins it is desired to pass. In both cases, at the end of the process, the arrow will be found opposite the product desired.

Table R has been arranged with reference to the employment of the Sounding-board above described. The several numbers given in one of its columns refer thereto, and are marked respectively + and -, according as the arrow is to be moved *forward* or *backward* a given number of pins. It may sometimes be found convenient to find the excess of + or - figures referring to any particular case, and thus have to move the arrow but once in a calculation.

APPENDIX K.

THE KRIEGSSPIEL METHOD OF CALCULATING CASUALTIES.

Translated from Lieutenant von Naumann's Detachment Kriegsspiel, Berlin, 1877.

As we go to press, we are in receipt of quite an invoice of valuable German works upon Kriegsspiel. Among the various codes of rules that have thus fortunately come to hand, that of Lieutenant von Naumann ("Das Regiments-Kriegsspiel," Berlin, 1877) seems to contain the latest improvements in method and data that have been made in the fatherland of the modern War Game. As a not uninteresting addition, therefore, to our own studies upon "Loss in Battle," we select from Lieutenant Naumann's code of rules the table whereby Casualties are calculated, together with a description of the method of its employment. This table will prove of value to the American student, not only as a means of comparison, but be of special interest as, perhaps, expressive of the latest German ideas upon the all-important subject treated. This Appendix lends a most opportune credence to our own studies and conclusions, and enables us thus to spread the problem before American students in the latest phase that it has assumed upon each side of the Atlantic. We are greatly indebted to Mr. Conrad Bollinger, Chief Clerk in the office of the Chief Quartermaster of the Military Division of the Atlantic, for this valuable translation.

The result of firing depends upon the following Points:

1. The number of firing units, i. e., the "Zug" infantry (66 men), the squadron dismounted, and the battery.
2. The range.
3. The time occupied in firing.
4. The moral and physical condition of shooter, i. e., his fighting or firing strength.
5. The condition and situation of target, i. e., arm of service, formation, protection, etc.
6. The number of units fired at.

To determine the modified effect of fire due to a consideration of the several points above referred to, recourse must be had to a "Table of Losses," which should naturally be based upon constant factors, such as those classed under Points 2 and 5.

The factors corresponding to the circumstances considered under Point 4 are entirely too variable for satisfactory tabulation, but must be introduced as modifiers of the final result.

Both the firing party and the party fired at are directly related to the 6 Points above mentioned, viz. : the former to Nos. 1, 2, and 3, and the latter to Nos. 5 and 6, while Point 4, as just noticed, must be left to the judgment of the Referee.

Now, with reference to the fundamental Point 5, it is proper to state that there will be distinguished 6 different grades of density and depth of the troops representing the target, without regard to cover, viz. :

Class A : the skirmish line (men 6 paces apart), single horsemen.

Class B : close skirmish line (men 3 paces apart).

Class C : closest skirmish line ($1\frac{1}{2}$ paces apart), field artillery, with regular space between pieces.

Class D : Infantry in single rank, closest skirmish line, with small supports; cavalry in swarms or in single rank; light artillery at regular intervals.

Class E : Company columns; infantry in line of battle; cavalry in line.

Class F : Infantry in battalion and other columns; cavalry in columns.

If Class C be taken as *unity*, the relative exposure "in the open" of the 6 different classes will be expressed as follows :

Factors of Aim : A = $\frac{1}{4}$; B = $\frac{1}{2}$; C = 1; D = $1\frac{1}{2}$; E = $2\frac{1}{2}$; F = 5.

Taking now for granted that "well-covered" troops will be exposed $\frac{1}{4}$, and "half-covered" troops $\frac{1}{2}$ of troops "in the open," the alterations necessary in the above proportions, when either of such classes of troops is considered, will be simply that for "well-covered" troops, they should be calculated two grades lower, and for "half-covered" troops one grade lower. The calculation is exact for Classes B and C, which are the most important ones in the series; for D, E, and F at "half covered" it is $\frac{3}{4}$, $1\frac{1}{4}$, $2\frac{1}{2}$, and at "well covered" it is $\frac{3}{2}$, $\frac{5}{2}$, $1\frac{1}{2}$ respectively.

The average results of the firing of one Zug of infantry at Class C for one minute, and at the various ranges in metres indicated is as follows :

Range in Metres = 200 300 400 500 600 700 800 900 1000 1100 1200 1300 1400

Factors of Range = 4 3 2 $1\frac{1}{2}$ 1 $\frac{4}{5}$ $\frac{3}{4}$ $\frac{2}{3}$ $\frac{1}{2}$ $\frac{2}{5}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{5}$

men, horses, points respectively,

or, of a *field battery for one minute*

Range in Meters = 700 to 900, to 1000, to 1250, to 1400, to 2000, to 2400, to 3000, to 4000,

Factors of Range = 10 9 8 $6\frac{2}{3}$ 5 4 $1\frac{1}{2}$ $\frac{4}{5}$

men, horses, points respectively.

For Class B the above results will be multiplied by $\frac{1}{2}$; for Class A by $\frac{1}{4}$, etc. The losses for any of the six classes of aim, or targets, at any given range, can be calculated by multiplying the Factor of Aim (i. e., A $\frac{1}{4}$; B $\frac{1}{2}$, etc.) by the Factor of Range. For simplicity, let the former be marked *a* and the latter *d*.

Example : The result of 1 minute firing of 1 Zug of infantry in line on infantry in single rank at a distance of 400 metres will be a loss of 3 men, viz. :

$$a = 1\frac{1}{2}. \quad d = 2. \quad \therefore a.d = 3.$$

Now, if in place of 1 Zug, *x* Züge are firing, and for *y* minutes instead of for 1, the loss would be *a, d, x, y*; or, if there be *n* units fired at, the loss would be $\frac{a, d, x, y}{n}$ per unit.

In the foregoing expressions, *d, x, and y* correspond with Points 1, 2, and 3, and are to be decided by the firing party, while *a* and *n* correspond with Points 5 and 6, and are to be decided by the Referee with reference to the party fired at.

In calculating losses, the firing party should first measure the range to get d , and multiply the same by x and y , the product of which represents the result of firing at Class C = 1, which product is announced to the Referee for the sake of such modification as may be deemed necessary.

Before going further, it is proper to point out two advantages shown by this arrangement, viz.: If each range has its separate factor, it is not necessary to mark the distances in metres on the usual measuring scales so long as the Factors of Range (d) are placed thereon at the proper intervals. The measurement by metres can therefore easily be done away with by adopting, for such scales, the pace. (See Figs. 6 and 7, Plate V.)

The second and no less important advantage of placing the Factors of Range on the scales themselves is the possibility of calculating simultaneously the result of the firing of infantry and artillery, or, generally, the result of the firing of different units at different distances. For instance, it is no more troublesome for the Umpire to calculate the result of the firing of 3 Züge at a range of 400 metres, and of 2 batteries at a range of 1,500 metres, than it is to find the range of the infantry and that of the artillery. If they both fired for 5 minutes, the product (d, x, y) will be $2 \times 3 \times 5 = 30$ for the infantry, and $5 \times 2 \times 5 = 50$ for the artillery, or, combining both, we have $(6 + 10) 5 = 80$; again, if the former had fired for 10 and the latter for 6 minutes, $6 \times 10 + 10 \times 6 = 120$. The commanders of both parties have to calculate this product independently.

It will be found that x and y will generally be much larger than in the foregoing example. As this would require too extensive a Table of Losses, it will be necessary to reduce one of the three factors of the product, which, however, will finally be increased again to its regular value. For this purpose, d appears to be best suited, and therefore all Factors of Range have been divided by 4, and, thus altered, will be found at proper intervals on the scales (Figs. 6 and 7, Plate V), by the use of which the above examples would become $(1\frac{1}{2} + 2\frac{1}{2}) 5 = 20$, and $1\frac{1}{2} \times 10 + 2\frac{1}{2} \times 6 = 30$.

Table "a," of Losses, Appendix K, gives this relative product* (except for Class C), and from it the loss per combating unit can be read in a very simple and mechanical way.

EXPLANATION OF TABLE "a" OF LOSSES.—The figures in the left-hand vertical column represent the announced "product d, x, y ." These are embraced in the limits which, it is found by experience, should not be exceeded in the "Detachment Kriegsspiel."

In the columns A to F will be found the respective Factors of Aim (a), which, on account of the Factor of Range (d) having been divided by 4, are all respectively multiplied by 4. The figures 1 to 5, under each of the 6 letters A to F, indicate the respective columns to employ in finding the loss per company, squadron, and battery, depending upon whether the object fired at consists of from 1 to 5 of these combating units.

The product d, x, y having been announced by the firing party, the Umpire will modify it, and fix its real value by increasing or diminishing the same according to circumstances with reference to Point 4, will decide the Factor of Aim, and name to his assistant the number of combating units. The announcement would, for instance, be as follows: "32 C for Blue, 1st, 2d, and 3d Companies." The assistant, by referring to the "Table of Losses," can at once see that the loss is 128 men, or 42 per each com-

* That is, the repeatedly mentioned product, with a multiplied and n divided.

pany, provided they all suffer alike. If this be not the case, on account, for instance, of one company being better covered, or its formation more favorable—but not to such an extent as would bring it under another Factor of Aim—the notification would be, say, “32 C for Blue, 1st, 2d, and 3d Companies, the last, 6 men less.” The scale of this discretionary reduction can be easily perceived, since for the succeeding Class B the loss would be but 21 men per company.

With regard to Point 4 it has already been stated that it must be left entirely to the judgment of the Umpire; in fact, it touches proportions which can only be observed and decided impartially by him; it depends principally upon the *moral strength of the firing party*, i. e., the general fighting strength of the troops, considering former losses and general situations. Again, the result of firing depends a great deal on the position of the shooter, inasmuch as the effect of firing from prepared cover will be more favorable than that of firing from the open field, and that of the latter more favorable again than the effect of firing while in motion. Fatigue should also be considered, and requires special attention in the “Kriegsspiel,” where performance of marches is generally under-estimated. Another important point to be considered in this connection is the strength of the enemy’s return fire upon the firing party.*

Recapitulation, Describing the Manner of Calculating Losses.—Rule XII.—The firing party measures the range with the scales (Fig. 6 and 7, Plate V), and multiplies the Factor of Distance (d) so obtained by the number of firing units (x) and the number of minutes (y) fired, announcing the product d, x, y to the Umpire. The Umpire, after modifying the same with reference to the firing strength of the party firing, etc. (Point 4), announces the *modified product, class fired at, and number of units fired at*, to his assistant, who, by referring to the Table, can at once give the number of casualties.

[The “metres” and “paces” of the original are retained in the translation for obvious reasons. The Factors of Range can, however, be readily transferred to the regular Strategos range scale, if desirable.]

Example: 2 Batteries open fire upon 4 companies of skirmishers, retiring and making occasional stands in heavy undergrowth at 5 yards’ interval, and continue the fire 12 minutes; what are the losses of the skirmishers? Average range, 2,000 paces.

Calculation: $d = \frac{4}{3}$, $x = 2$, $y = 12$: $d, x, y = 32$.

Modification: As the skirmishers are retiring, etc. ($\frac{1}{3}$), and in heavy undergrowth ($\frac{1}{4}$), they will only suffer ($\frac{1}{3}$ of $\frac{1}{4}$), or $\frac{1}{12}$ of the estimated product. So the Referee’s announcement is, “4 companies in Class A fired at; modified product, 3.” The assistant, after consulting the Table, replies: “Loss, 1 per company; 3 in all” (i. e., between 2 and 4).

* It would far exceed our limits to translate Von Naumann’s method of calculating the modifications due to these and other circumstances of action. Such modifications have in fact already received due consideration in “Strategos,” in Table R, of Multipliers, and to them the Referee is referred in deciding the relative influence of the various circumstances that are here classed under the head of Point 4.

APPENDIX L.

REPORTS OF THE BOARDS OF REGULAR ARMY AND NATIONAL GUARD OFFICERS, CONVENED AT SAN FRANCISCO, CALIFORNIA, IN JUNE, 1878, TO EXAMINE AND REPORT UPON STRATEGOS.

To the ASSISTANT ADJUTANT GENERAL, Military Division of the Pacific and Department of California.

SIR: The Board convened by Paragraph 4, Special Orders No. 68, current series, Headquarters Military Division of the Pacific and Department of California, having made the examination required in that order, has the honor to submit the following report: . . .

The game of "Strategos," presented for the consideration of the Board by First Lieutenant Charles A. L. Totten, Fourth Artillery, consists of four parts: the first, illustrative of the Minor Tactics of the three arms; the second, a "Topographical Game"; the third, called the "Battle Game," illustrating the tactical disposition of troops in order of battle with little or no consideration of topography, and the tactical manœuvres of extension or change of lines and concentration of masses; the fourth, called the "Advanced Game," represents with all attainable completeness the marches and engagements of a campaign in the course of a single battle. The whole is offered as an aid to military study in all grades.

The pieces used in each of these parts serve to a greater or less extent in each of the other three, and all form a convenient adjunct to the map in the study of Military History.

1. MINOR TACTICS OF THE THREE ARMS.

The *matériel* presented under this head consists of blocks representing individual officers, non-commissioned officers, and soldiers, sets of fours, companies or squadrons, battalions, field-guns, caissons, batteries, etc., the same blocks often having different meaning, according to the tactical problem illustrated, with corresponding magnitude of bodies of troops considered and scale of representation.

With these blocks the elementary problems in minor tactics, as the formation of bodies of troops with posts of officers, the formation of incomplete sets of fours, the posts and changes of position of the cannoneers at the various guns, may be illustrated, as also the posts and movements of guides in the school of the battalion, the movements of limbers and caissons in the battery drill, and of tactical units in the higher evolutions.

It is the opinion of the Board that this contrivance furnishes a valuable adjunct to the volume of Tactics in the instruction of officers and non-commissioned officers, both as a means of imparting information and of testing proficiency.

2. THE TOPOGRAPHICAL GAME.

The blocks and pieces employed in this part of the game of Strategos are the same that are used in the tactical studies. They are now turned over so as to expose their reverse sides, upon which the various topographical features, such as woods, mountains, swamps, rivers, villages, etc., are depicted.

These topographical blocks are to be used in conjunction with others (tactical side up) to illustrate the various principles of strategy, affording to the various text-books and authorities upon these subjects the same ready illustration that, with their tactical face up, they do to the manuals of tactics.

3. THE BATTLE GAME.

This may be described as an extension and modification of chess, such as to make the mimicry of that game more nearly represent the *tactical* conditions of battle.

The powers and moves of the pieces are carefully determined to conform to those of the three arms. The extent of the board is unlimited. The number and kind of pieces, with their first arrangement on the board, are left to the judgment of the player, in the intention of making this game an exercise in the tactical formation of lines of battle. The rules of the game are such as to force the players to consider arrangement and concentration, rather than captures and losses.

While this game presents no problems that may not be more fully considered and more perfectly solved by the use of the finer appliances and more elaborate rules of the Advanced Game, its simple methods give it a convenience which may secure it a considerable use. It is strictly a game, rather than a professional study, but it furnishes, at the least, a diversion of a highly military character, well calculated to stimulate discussion of professional questions.

It is proper to observe that this game has no outfit peculiar to itself, all its appliances being used in other branches of Strategos. Into the consideration of expense it does not therefore enter.

4. THE ADVANCED GAME.

This is the analogue of the Prussian Kriegsspiel, already adapted to the English organization and tactics, and adopted, by authority, in the English service.

Its appliances are similar to those of European games, the sizes of the blocks representing regiments, etc., being accommodated in the established scale to the strength of those bodies in the United States Army.

Its rules and method of procedure are, in general, like those of the European games. In comparison with the English rules, an official copy of which was presented for examination, the most noteworthy points of difference are:

1st. A much greater fullness and explicitness in the rules for the guidance and information of the Referee; these rules being always suggestive, not binding, leaving him free in the exercise of his judgment, as enlightened by his own experience and study.

2d. A more minute analysis of the conditions of actual conflict; a correspondingly

accurate determination of the ratios representing chances of success of the two sides; and a more elaborate system of tables for assigning the result of engagements and consequences of victory or defeat.

3d. The presentation in the tables, not only of material for decisions in the game, but also of valuable professional information in form convenient for reference in study.

Believing the usefulness of a game of this nature to be fully established by the experience of other armies, the Board has considered the differences of this game from the English with reference to the circumstances of our service.

First. The more vague and general rules of the English system absolutely require that the office of Umpire or Referee be filled by an officer of wide and varied experience and study. This is recognized in the preface to the official publication: "the value of the game, indeed, depends almost entirely upon the Umpire." In the small garrisons in which our army is scattered, the presence of such officers is necessarily exceptional. A carefully considered body of rules sufficient for the guidance of the Umpire, without destroying his discretionary power, and strengthened by reference to the authorities from which they are derived, is held to be an important adaptation to American conditions.

Second. The more elaborate tables and more complicated systems of ratios are believed to be an advantage, whenever a game is carried to its conclusion in a general engagement. While the machinery of the game, as such, is thereby rendered somewhat complicated, the amount of instruction conveyed is materially increased.

While it is not to be expected that these tables, or those of the English game, are free from error, the presentation of much professional information in a tabulated form, as in this game, with authorities, would appear likely to awaken discussions of no small value. In the English game, on the contrary, the decisions of the Umpire derive weight solely from the authority which promulgates them, not from other obvious grounds.

It is believed that each of these differences renders the game better in itself as a means of instruction, or more fitted for use in the conditions of service of the United States Army.

The Board therefore recommends that sets of this game be furnished to each Division, Department, and Regimental headquarters, and to each library post.

The Board also recommends that Lieutenant Totten be authorized to visit the seat of the Government, the Military Academy at West Point, and the Artillery School, for the purpose of explaining the features of his game.

(Signed)

AUGUST V. KAUTZ,

Colonel, 8th Infantry.

WILLIAM H. FRENCH,

Colonel, 4th Artillery.

J. C. KELTON,

Lieutenant Colonel, A. A. G.

H. C. HASBROUCK,

Captain, 4th Artillery.

J. B. CAMPBELL,

Captain, 4th Artillery.

CARL F. PALFREY,

First Lieutenant of Engineers.

Endorsement of Major General Irvin McDowell, and forming Part of his Annual Report to the General of the Army, 1879.

HEADQUARTERS, MILITARY DIVISION OF THE PACIFIC AND DEPARTMENT OF CALIFORNIA.
PRESIDIO OF SAN FRANCISCO, CAL., September 30, 1878.

I beg to submit herewith a report of a Board of Officers, to whom was referred a paper giving an account of a War Game, prepared by First Lieutenant C. A. L. Totten, Fourth Artillery. I am not competent to decide the question as to the relative merits of Lieutenant Totten's "War Game" as compared with that in use in Europe, but the subject is an interesting one, and I ask for Lieutenant Totten that the recommendations made by the Board be approved.

(Signed)

IRVIN McDOWELL,
Major General Commanding Division and Department.

HEADQUARTERS, SECOND BRIGADE, N. G. C., SAN FRANCISCO, CAL.
November 18, 1879.

GENERAL ORDERS }
No. 10.

I. The Board of Officers, convened by S. O. No. 33, from these Headquarters, consisting of Lieutenant Colonel David Wilder, Major C. Mason Kinne, and Major R. H. Orton, and detailed for the purpose of examining the apparatus invented by Lieutenant C. A. L. Totten, Fourth Artillery, U. S. A., as a War Game, and for demonstrating the movements of troops in battle, having made a critical examination of the merits and applicability of "Strategos" to the wants of the National Guard, make an elaborate report, which is hereby approved and furnished for the information of the members of the Second Brigade, N. G. C.

SAN FRANCISCO, October 9, 1879.

MAJOR S. W. BACKUS, A. A. G., SECOND BRIGADE, N. G. C., SAN FRANCISCO:

MAJOR: The undersigned, composing a Board, convened by S. O. No. 33, Headquarters Second Brigade, N. G. C., dated June 25, 1879, "to examine the apparatus invented by Lieutenant C. A. L. Totten, Fourth Artillery, U. S. A., for demonstrating the movements of troops in battle, and report on its applicability to the wants of the National Guard in the study of Tactics, as well as to consider all the merits claimed by the inventor," have the honor to report that they have made a full examination of the apparatus, and of the rules and tables for its use, which together constitute the series of games or studies to which the inventor gives the name of "Strategos," and which he offers as an American Game of War.

I. THE OUTFIT.

The Outfit of "Strategos," as of every war game, consists chiefly of pieces representing bodies of troops. Most of these pieces are of type-metal, and, on maps with a scale of 10 inches to the mile, would accurately represent the space covered by half-battalions, squadrons, batteries, skirmish lines, engineer companies, baggage-trains, field-works, etc. Practically, they may be used on maps with scales of from 8 to 12 inches, or, by considering them to represent double their strength, on maps with scales of from 4 to 6 inches. Besides the metal pieces, there are a number of pieces made of pasteboard, slated on one side; some of these are on the 10-inch scale, while others, intended to represent small

bodies of troops, or single officers, sentries, or messengers, are of convenient size. On the slated side can be marked the insignia of the character sustained by the piece. The reverse side of each of the larger slated pieces has some topographical feature delineated upon it—a village, a marsh, a wood, a section of a hill or of a river; and these pieces are so numerous that any desired combination of topographical features may be represented. They form an original and valuable addition to the metal pieces, which themselves are many times more numerous than those supplied in the English game.

The outfit of "Strategos" includes no maps, the inventor wisely believing that each student will prefer, and can at less cost obtain, some large scale map of his own neighborhood. Silicated cloth is supplied, upon which, with the aid of the pantograph (also furnished), any military map may be drawn upon the required scale. A silicated board, in sections, and ruled in inch squares, is furnished for the "Battle Game"; the Outfit also includes scales, dice, counters, colored pencils, and other minor requisites, the whole Outfit (except the silicated cloth) being packed in a box 26 x 32 x 6 inches in size.

II. APPLICATIONS OF THE OUTFIT.

Tactics, Topography, and History.

A comparison of the excellent "Automaton Company" and "Regiment" of Brewerton, or the more recent and costly toy of another inventor, with the "Strategos" Outfit, shows that the capacity of the former and other similar apparatus is limited to minor tactics, while that of the latter is unlimited, affording illustrations of every movement and situation in war, from the formation of an incomplete set of fours to the most complicated operations of great armies. During the first studies of the recruit, the various pieces enable him or his instructor to exemplify, more promptly and no less clearly than by the apparatus already mentioned (which answers that purpose and no other), the positions and movements of officers and men in all the manœuvres of a squad, a company, a battery, a battalion, or any larger body. Advancing to the study of grand tactics and strategy, the same pieces are available, and the topographical pieces enable the student of either the theory or the history of war to reproduce the situations described in the books, and, with the aid of the silicated cloth and the pantograph, to follow closely the course of a battle, realizing each successive stage of it in a way which with ordinary battle maps is always difficult and often impossible. For all these purposes the apparatus of "Strategos" is, in the opinion of this Board, far superior to any other. By the facility and pleasure with which it can be used, National Guardsmen will be led on from minor tactics—which with most of them is now the beginning and the end of military science—to consider the real problems of war, and to see how vast and interesting is the field of study not covered by the "Revised Upton."

The Battle Game.

This is an ingenious compromise between a game and a study—between chess and actual war. Its rules are not much more complicated than those of chess, and the respective moves of infantry, cavalry, and artillery pieces differ somewhat as those of the Bishop, the Knight, and the Rook. Yet it affords most valuable training in grand tactics, and its course resembles closely the real operations of a battle, only so much of reality being sacrificed as is necessary to give it interest and make it practicable as a game. For nearly all National Guardsmen it will be the highest application of the "Strategos" outfit.

The Advanced Game.

Of the four different applications of the Outfit already mentioned, the first (tactical) has numerous prototypes, but goes far beyond them; the second (Topographical), the third (Historical), and the fourth (the Battle Game), are original with Lieutenant Totten. All have great value. It remains to speak of the fifth application, the only one which comes into comparison with the German "Kriegsspiel" and its English and other adaptations. This, in "Strategos," is called the "Advanced Game." Following as closely as possible all the conditions of actual war, and serving as the highest and most difficult form of military study, it requires more leisure and higher training than are often found among National Guard Officers, and its use will probably be confined almost entirely to the Regular Army. We need only say, therefore, that the rules and tables for playing it constitute in themselves a text-book of the greatest value and interest, full of the tactical and statistical results of experience in war, and that the game appears to us superior to the German and English games in every point in which it differs from them.

As a result of our examination of "Strategos," we cordially recommend it to all National Guardsmen, and we respectfully suggest that the purchase of a set for each headquarters would be a legitimate and beneficial expenditure from funds of the State, should such be available.

Very respectfully, your obedient servants,
 (Signed) DAVID WILDER,
Lieutenant Colonel, 1st Infantry, N. G. C.
 C. MASON KINNE,
Major and Judge Advocate, 2d Brigade, N. G. C.
 R. H. ORTON,
Major, 1st Cavalry, N. G. C.

II. Lieutenant Colonel David Wilder, Major C. Mason Kinne, and Major R. H. Orton, having performed the duty assigned them, are hereby relieved from such special duty, with the thanks of the Brigade Commander.

By command of BRIGADIER GENERAL JOHN McCOMB.

(Signed) S. W. BACKUS, A. A. G.

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